THE

AMERICAN GAS-LIGHT JOURNAL.

THE OFFICIAL GAZETTE OF

LIGHT, HEAT, WATER-SUPPLY, AND SEWERAGE.

Rooms—No. 39 Nassau Street, cor. Liberty Street, opposite the Post-Office, New York.

LONDON:—TRUBNER & CO., No. 60 PATERNOSTER ROW.

VOL. III.—No. 59. NEW-YORK, MONDAY, JUNE 2, 1862. $3 PER ANNUM.

HERRING'S PATENT

Champion Fire-Proof Safes.

Herring's Champion Burglar-Proof Safes, with Herring & Floyd's New Patent Crystalized Iron, the only metal which cannot be drilled.

Nearly 25,000 Herring's Safes have been made and sold, and over 500 have passed triumphantly through accidental Fires, thus fully sustaining their acknowledged and well-earned character as the "best Fire-Proof Safes the world ever saw."

Herring's New Patent Burglar-Proof Safes, made of a combination of Wrought Iron, Patent Crystalized Iron, and Bars of Steel, are confidently offered to the public as the strongest and best security against skilful burglars now extant.

It was a "Herring's Burglar-Proof Safe," the public will remember, which so lately held secure its trust against the determined ingenuity of the boldest and greatest mechanical burglars this country has ever known, and saved for the New York Exchange Bank no less than

HALF A MILLION OF DOLLARS.

Herring's Patent Fire and Burglar-Proof Safes *combined*, (one Safe within another,) making the most perfect protection from fire and thieves now known.

FIVE OF HERRING'S SAFES VICTORIOUS!

WELLSBORO', Penn., December 21, 1861.

Messrs. Herring & Co., New York:

Gentlemen,—At the great fire which occurred here on the 18th December last, my store, with a number of other buildings, was entirely destroyed; no less than seven places of business were burnt out and five of your safes severely tested, in every instance saving their entire contents, to the complete and perfect satisfaction of the owners. Two of your Herring's Patent Champion Safes which were in my building remained there through the entire conflagration, and were not opened until the day after the fire. No water was thrown on the building. Everything in my safe after the fire was nearly as good as new. C. L. Wilcox also preserved all his books, papers, and money in two of your safes, both being in same fire. Wm. Roberts was also the fortunate owner of another of your Patent Champion Safes, which was severely tested, and saved completely his books, papers, and money. The result has given great satisfaction, and we want no safe but Herring's Champion. Please send me one same size I last bought of you immediately. Send by N. Y. & Erie R.R. via Tioga depot. JOHN R. BOWEN.

I had two of Herring's Safes in above fire. They saved my books, papers, and $2.000 *in bank bills.* C. L. WILCOX.

HERRING'S PATENT CHAMPION saved my books, papers, and about $400 in *paper money.* I would use no other. WILLIAM ROBERTS.

GREAT FIRE IN PEARL AND FULTON STS.

NEW YORK, Jan. 27, 1862.

Messrs. HERRING & Co., No. 251 Broadway:

Gentlemen,—The large HERRING'S PATENT CHAMPION SAFE you made for me a few years ago has been put to a severe test in the great fire corner Fulton and Pearl sts., on the 26th inst., which entirely destroyed my building, together with many others.

The fire commenced about 6 o'clock on Sunday morning, and the safe was taken from the ruins after an exposure of more than thirty hours.

Your Safe contained all my books, insurance policies, and other valuable papers besides, gold and silver, bank bills, coupon bonds, &c., amounting to over Two Hundred Thousand Dollars. Everything in the Safe is in perfect order, except the binding of the books being steamed.

Your Patent Champion Safe gives us great satisfaction, and has guarded safely through the fire every dollar of its contents.

Truly yours, A. S. FOSTER.

GREAT FIRE IN NEW JERSEY.

NEW BRUNSWICK, N. J., January 18th, 1862.

Messrs. HERRING & Co.,

No. 251 Broadway, New York:

Gentlemen,—At the recent extensive fire in our city, on Wednesday morning last, 15th inst., I was the fortunate owner of one of your HERRING'S PATENT CHAMPION SAFES, which contained some books and a number of valuable papers.

The heat in my store was very great, and the safe subject to an intense heat. I felt great interest in the safety of my papers, as a number of castings in my store and within a few feet of the safe were melted. Nothing, indeed, was saved in my building, except the contents of your safe, which I am happy to inform you was completely preserved, after a thorough roasting for some seventeen hours. The result has exceeded my anticipations, and fully confirmed my confidence in the security of your Herring's Patent Safe. Please send me another of larger size, and refer all incredulous to my books and papers, which it gives me great pleasure to show.

WM. H. ARMSTRONG.

Herring & Co., 251 Broadway.
Farrel, Herring & Co., Phila.
Herring & Co., Chicago.

IRON FOUNDRIES.

BERGEN IRON WORKS, Established 1833.

R. A. BRICK, Manufacturer of CAST IRON WATER and GAS-PIPES. RETORTS, PIPES, &c., always on hand. Office, 109 Leonard Street, New York.

S. V. MERRICK, J. VAUGHAN MERRICK, W. H. MERRICK.

SOUTHWARK FOUNDRY, Philadelphia.

MERRICK & SONS, Engineers, Manufacturers of every description of Gas Machinery.

Retorts, Bench Castings, Condensers, Washers, Scrubbers, Wet or Dry Lime Purifiers, Coke Wagons, Fire Tools, Wrought Iron Grate Bars, Gasholders, either TELESCOPIC OR SINGLE, WITH SUSPENSION FRAMES COMPLETE; Wrought Iron Roof Frames, for Iron or Slate; Stop Cocks, Exhausters, Steam Pumps, Boilers and Tanks, Steam or Hand Air Pumps for proving Street Mains, Centre Seals, Governors, Wrought or Cast-Iron Lime Sieves for Purifiers, Purifier Hoisting Machines, &c., &c.

Address— MERRICK & SONS,
5th and Washington Streets, Philadelphia.

OREGON FOUNDRY, Nos. 740, 742, 744 Greenwich Street, New York.

HERRING & FLOYD, proprietors, manufacture Gas Compensators of all sizes, Self-Acting Valves, Exhausters upon an improved plan, costing less than half those of English manufacture, also castings of every description for Gas and Water Works.

Herring & Floyd offer for sale Sabbaton's Patent Screening Shovels for coke and coals, made of malleable iron, of all sizes; Sabbaton's Patent Improved Cast Iron Furnace Frame and Door, arranged to protect the iron work of the door and frame from direct contact with the fire; also, Floyd's Patent Malleable Iron Retort Covers, only quarter of an inch thick, but of convex form, and of great strength, as is attested by certificates from several of the leading Gas-works in America. For engravings of all the above patents see AMERICAN GAS-LIGHT JOURNAL for October, 1859, pages 65 and 71.

Samples of the above castings can be seen at the Rooms of the AMERICAN GAS-LIGHT JOURNAL.

S. FULTON & CO., (Successors to Colwell & Co.) Manufacturers of Pig Iron and Cast Iron Gas and Water Pipes, also Heavy and Light Castings of every description, No. 207 North Water street and 206 North Wharves, Philadelphia.

SAMUEL FULTON, THEO. TREWENDT.

TRANER & MERCER, 117 NORTH Water Street, & 124 North Wharves, Philadelphia, AGENTS FOR THE MERCER FOUNDRY, AND ELK SHEET IRON WORKS.

CAST IRON STREET MAINS; *Bends, Branches, Chemical Retorts, and all kinds of Castings for* GAS-WORKS, either COAL or ROSIN WORKS. SHEET IRON FOR GASOMETERS *cut and punched to order.* BOILER IRON *of all descriptions.* RUSSIA SHEET IRON, TIN PLATES, BLOCK TIN, COPPER, PIG LEAD, SPELTER, and Metals generally.

FLORENCE IRON WORKS.—The subscriber is prepared to execute orders and make contracts for Cast-Iron Water and Gas-Pipes, from 2 inches to 48 inches in diameter; also, Retorts, Bench-Castings, Branches, Bends, and all Castings for Water or Gas-Works. Pipes and Castings coated with Smith's Patent Coal Tar Varnish to prevent corrosion.

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205½ Walnut Street, Philadelphia.

R. D. WOOD & CO.,

MANUFACTURERS OF

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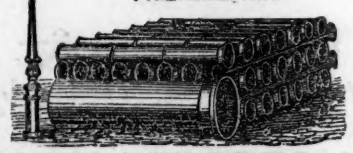
Office, 400 Chestnut Street, PHILADELPHIA.



TO GAS AND WATER COMPANIES:

The undersigned, Agent for Messrs. Thomas Edington & Sons, Phenix Foundry, Glasgow, Scotland, is prepared to contract for all descriptions of Cast-Iron Pipes of their manufacture.

About 6,000 tons of these Pipes have lately been supplied to the Brooklyn Water-works, N. Y., and the Chief Engineer of the Works, A. P. Kirkwood, Esq., is ready to testify to their excellent quality.

ARCH'LD BAXTER, 28 Beaver St., N. Y.

Sole Agent for the United States and Canada.

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MORRIS, TASKER & CO., PASCAL IRON WORKS,

[ESTABLISHED 1821,]

PHILADELPHIA, manufacture Wrought Iron Welded Tubes for Gas, Steam or Water; Lap-Welded Boiler Flues,

GALVANIZED WROUGHT IRON TUBES,

ARTESIAN WELL PIPES,

of Wrought or Cast-Iron, screwed together, flush inside and out; Gas-works Castings, Retorts and Bench Castings for Coal Gas-works,; Cast-Iron Street Mains, Bends, Branches, Drips, &c.

GAS AND STEAM FITTERS' TOOLS, &c.

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N. B.—A complete selection of Patterns on hand. Refer to any of the Gas-Works in the Western and Southwestern States.

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JACOB HOUGHTON, Engineer, Detroit.

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REFERENCES.

Croton Aqueduct dept., N. Y.
Manhattan Gas Lt. Co., N. Y.
Brooklyn Water dept., N. Y.
Brooklyn Gas Lt. Co., N. Y.
Citizens' Gas Lt. Co., Brooklyn, N. Y.

CAST IRON PIPES.—EARL'S IRON WORKS, NEWARK, N. J., 91, 93, 95, 97 and 99 Chestnut Street. Branch Office, 21 Centre street, New York.

The subscriber continues to manufacture Superior Cast-Iron Gas and Water Pipes, Branches, Bends, Angles, Bevel Hubs, Reduces, Sleeves, Drip Syphons, Plugs, Caps, Retorts, Bench Castings, and Castings in general. Particular attention paid to all Castings connected with Gas-Works. E. B. EARL.

TO VERTICAL PIPE MANUFACTURERS.—WANTED, a situation as Foreman, or would prefer taking the work by contract, by a man that has had twenty years' experience in Vertical Pipe Moulding; also, has had some years' experience in Green Sand Moulding; best of reference given, by addressing FIRTH & INGHAM, Warren Foundry and Machine Shop, Phillipsburg, New Jersey.

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GASOMETERS, RETORT-HOUSE ROOFS, WATER-TANKS,

PURIFYING-BOXES, COAL-CARS, COKE BARROWS,

AND ALL KINDS OF

WROUGHT-IRON WORK FOR GAS AND WATER WORKS.

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GAS-HOLDERS,

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And all other descriptions of

Iron Work for Gas-Works, Water-Pipes, and Heavy Castings, and Machinery generally.

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THE LUTHER ATWOOD OIL COMPANY'S

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ILLUMINATING OIL,

Unsurpassed by any KEROSENE manufactured. Is nearly COLORLESS, of a PLEASANT ODOR, and burns without smoke, or crusting the wick.

WARRANTED NON-EXPLOSIVE.

For sale in any quantity at a greatly reduced price.

Packed in cans and cases for foreign markets. Apply to U. TALLMAN,
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COAL OIL! COAL OIL!! of the celebrated brand of "SILVER SPRING." A superior burning oil, white, pure, safe, and odorless.

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No. 132 Maiden Lane.

A LAMP CHIMNEY THAT WILL not break.—Made for the million.

The patent Mica Chimneys for coal-oil Lamps possess many advantages over the glass chimneys. They do not break from the heat, falling, cleaning, or any ordinary usage. When one is purchased it will last, with care, as long as the lamp. They fit all the burners now in use.

AMOS HORNING,

Agent for Manufacturer,
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N. B.—Coal-Oil Lamps and Coal-Oil at low rates.

PATENTED OCT. 8, 1861.

Dithridge's Patent

OVAL LAMP CHIMNIES,

for Coal-Oil burners. Manufactured of

XX FLINT GLASS.

These chimnies are intended for the flat flame which, heating all parts of the glass equally, does not expose it to cracking.

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Fort PittGlass Works,
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THE LOVERS' LAMPS.—Price Five Shillings ($1.25) each. To supersede Candles and Night Lights. No Dressing or Trimming required.

EDMUND SPILLER,
Patentee,
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Post-Office orders attended to.

Ambrose's

PATENT

COAL-OIL, NO-CHIMNEY BURNER,

For Portable LAMPS, LANTERNS, Etc. Requires no Chimney.

Address,
J. E. AMBROSE,
249 Pearl st.,
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Jersey City, N. J.

COAL OIL, FOR BURNING.—Fine quality, 40 to 50 cents per gallon, according to quantities. Dealers and consumers can obtain it at the above rates of XAVIER GEX, coal-oil refiner, 75 William street.

AGENTS.—TO ALL WHO USE Candles.—The Candle Lamp just out. Safety and economy in light. No excuse for using explosive fluids. No dropping of tallow on carpets. The Candle Lamp will be sent free on receipt of 25 cents. Agents, male and female, can make a larger profit, and find a quicker sale for the Candle Lamp, than any article yet offered to the public. Send red stamp for illustrated circular.

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THE
STERLING GAS-REGULATOR,
Improves the Light and Saves a Large Per Centage of Gas.

MANUFACTURED BY THE
WHEELER & WILSON SEWING MACHINE COMPANY.

It is well known that Printers require the best and most brilliant light. In proof of the superiority of these Machines over all others, the following New York establishments are using them, and testify to their excellence:—New York Times, New York Herald, New York World, New York Tribune, New York Sun, Journal of Commerce, Courier & Enquirer, Evening Post, The Zietung, Dispatch, Leader, Scientific American, Advertiser and Spectator, Independent, Daily News, Harper's Monthly and Weekly, Transcript, Mercury, Atlas, Life Illustrated, Albion, Spirit of the Times, AMERICAN GAS-LIGHT JOURNAL, Christian Enquirer, Churchman, Church Journal, Christian Advocate, Christian Ambassador, Christian Intelligencer, Observer, Sunday Times, Sunday Courier.

By order of the New York and Brooklyn Common Councils, these Regulators are now used in the City Halls, Police Stations, Markets, and other Public Buildings in both cities.

They are Warranted by the
WHEELER & WILSON SEWING-MACHINE CO.,
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To keep in order, and always maintain the pressurs of the Gas at the lowest point for a brilliant light and economical combustion. They are so constructed that *under no circumstances can the Mercury get into the Meters, or in any way injure them.*

WARREN'S PATENT WATER & ALARM GAUGE
For Protecting the Flues and Preventing Steam-Boiler Explosions.

This is a reliable High and Low Water Detector, arranged so as to render it one of the best Water Gauges ever attached to a Steam-Boiler; always presenting before the Engineer at sight the exact height of the water, and if, by oversight or by sudden leakage, the water gets low in the boiler, it will cause an alarm before the water gets below the flues, thereby preventing an explosion. This Gauge can be made to alarm at any point desired as a High Water Detector, thereby preventing the water from getting to that height as to be forced into the cylinder of the engine, often causing serious accidents. Thus it is a High as well as a Low water Detector. For sale by

WARREN & BANKS,
153 Centre st., corner of Canal st., New York,
Where a Gauge is constantly in operation.

GAS, STEAM, SMOKE,
PURE WATER & SOIL PIPE,
FROM
JOSEPH CLIFF
Wortley Fire-Brick Works, Leeds, England.

T. W. PARMELE, Agt.,
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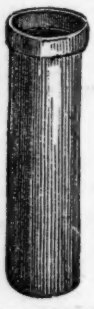

JOHN RUSSELL & CO.,
PATENT TUBE MAKERS,
THE OLD TUBE WORKS, WEDNESBURY, AND THE ALMA WORKS, WALSAL, STAFFORDSHIRE,
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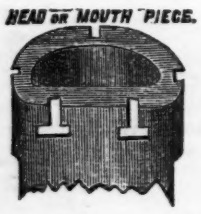
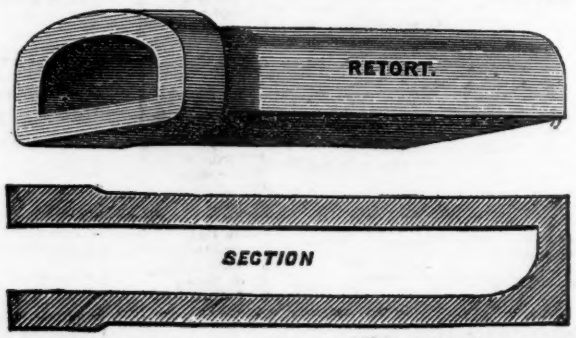
AND 35 GRANBY ROW, MANCHESTER, ENGLAND.

The original Manufacturers of WROUGHT-IRON GAS TUBES, and the Inventors of the Lap-welded Tubes for Locomotive and Marine Boilers. All kinds of TUBES and FITTINGS, whether for Gas, Steam, or Water. Galvanized and Composition Tubes. Chandeliers, and every kind of Brass work for Gas and Steam.

STOCKS, DIES, AND TAPS OF ALL SIZES. CAST-IRON PIPE AND GAS-METERS.
All Goo is Warranted.

KING BROTHERS,
STOURBRIDGE, ENGLAND, FIRE-BRICK AND RETORT WORKS.





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Free from Cracks and Correct in Form.

By great care in Manufacturing, combined with the advantages in Burning, a VERY SMOOTH SURFACE is obtained, rendering them less liable to carbonize.

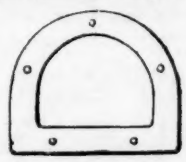
RETORT OVENS, FIRE-BRICKS, GUARDS, SADDLES, RABITTED BURS, FLUES, AND QUARRIES, ARE ALL MANUFACTURED OF THE SAME QUALITY OF CLAY.

EVERY RETORT AND BRICK IS BRANDED "KING BROTHERS, STOURBRIDGE."

Apply to E. W. BARSTOW, 83 Maiden Lane, New York, where samples can be seen.

HARRIS & PEARSON,
PROPRIETORS OF
Best Glass-House Pot & Crucible Clay.
Manufacturers of Fire-Bricks, Gas-Retorts, and Glass-House Furnace-Bricks of every description.
AMBLECOTE FIRE-CLAY AND BRICK WORKS, STOURBRIDGE, ENGLAND.

COWEN'S PATENT FIRE-CLAY RETORTS.



JOSEPH COWEN & CO.,
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Have always been, and are still, the most extensive manufacturers of FIRE-CLAY RETORTS in the United Kingdom, and were the only parties to whom a Prize Medal was awarded at the Great Exhibition, in London, 1851, for

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J. C. & CO. make Fire-Clay Retorts of all shapes and dimensions, and to fit existing mouth-pieces.

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N. B.—J. C. & CO.'S RETORTS are well adapted for small Gas-Works, as they can be used without an Exhauster.

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We are now publishing regularly the names of the thirty thousand post-towns in the United States, so that builders of gas-works and water-works, and the various manufacturers, may see where are new openings for business. And as each post-master will receive several copies of the AMERICAN GAS-LIGHT JOURNAL, for distribution, the number thus circulated will probably exceed *Three Million Copies. What a chance for advertisers!*

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Showing where Gas-Works and Water-Works are Wanted.

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5 Counties, 87 Towns, 7 Gas-Works, 1 Water-Works.

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East Greenwich, (ch) Phenix, Warwick Neck,
Escoheag, Quidnick, West Greenwich
Natick, Rice City, Centre.

Newport County.

Adamsville, Little Compton, South Portsmouth,
Bliss Four Corners, *Newport*, (c. h.,) Tiverton,
Jamestown, New Shoreham, Tiverton Four Corners
Portsmouth,

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Albion, Harmony, Olneyville,
Burrillville, Knightsville, Pascoag,
Centredale, Lime Rock, Pawtucket,
Chepachet, Lonsdale, *Providence*, (c. h.,)
Cumberland Hill, Manton, Rockland,
Diamond Hill, Manville, Slaterville,
Fiskville, Mapleville, South Foster,
Foster, Mohegan, South Scituate,
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Georgiaville, North Scituate, West Gloucester,
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Carolina Mills, Peace Dale, Usquepaugh,
Charlestown, Perrysville, Wakefield,
Davisville, Pine Hill, Westerly,
Dorrville, Potter Hill, Wickford,
Exeter, Quonochontaug, Woodville,
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SOUTH CAROLINA.

30 Counties, 605 Towns, 3 Gas-Works, No Water-Works.

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Cambridge, Harrisburgh, Sandover,
Cherokee Heights, Hodges, Smithville,
Cokesbury, Indian Hill, Swancy's Ferry,
Diamond Hill, Level Land, Temple of Health,
Donaldsville, Long Cane, Warrenton,
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Butlersville, Melville, Silver Glade,
Calhoun, Moffettsville, Slab Town,
Churubusco, Mountain Creek, Steele's,
Craytonville, Newell, Storeville,
Double Branches, Orrville, Townville,
Douthet, Pendleton, Twenty-Six,
Equality, Pierce Town, Varennes,
Evergreen, Queensboro', Williamston.

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Allendale, Erwinton, Mims,
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Bamberg, Graham's Turn Out, Smyrna,
Barnwell C. H., Greenland, Speedwell,
Blackville, Hammond, Tinker's Creek,
Buford's Bridge, King Creek, White Pond,
Cowpen Branch, Lower Three Runs, Williston,
Davis' Mills, Merritt's Bridge, Windsor,
Duck Branch, Midway, Woodward.

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Beach Branch, Greenfield, Long Branch,
Beaufort, (c. h.,) Hardeeville, Pocotaligo,
Bluffton, Hickory Hill, Robertsville,
Brighton, Hilton Head, Sand Hill,
Danielton, Horse Gall, Silver Hill,
Gillisonville, Lawtonville, Steep Botom,
Grahamville, Whippy Swamp.

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Black Stocks, Crosbyville, Rich Hill Cross Roads,
Baton Rouge, Halsellville, Rossville,
Beckamsville, Hazlewood, Sandersville,
Carmel Hill, Landsford, Tomsville,
Cedar Shoal, Lewisville, Torbit's Store,
Chester C. H., Lowrysville, Wallace,
Cornwell Turnout, Well Ridge.

Chesterfield District.

Catarrh, Hornsborough, Old Stone,
Cheraw, Jefferson, Pine Tree,
Chesterfield C. H., Mount Croghan, White Plains.

Clarendon District.

Friendship, Manning, New Zion,
Fulton, Wright's Bluff.

Colleton District.

Adam's Run, Elmville, Ridgeville,
Ashapoo Ferry, Jacksonborough Depot, Rumph's Bridge,
Blue House, Saint Georges,
Broxton's Ridge, Jedsburgh, Saltketcher Bridge,
Buckhead Causey, Reevesville, Walker's,
Edisto Island, Walterboro'.

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Cartersville, Lisbon, Sparrow Swamp,
Darlington C. H., Lydia, Swift Creek,
Florence, Merchant's Bluff, Tan's Bay,
Gully, Philadelphia, Thomas's Cross Roads
Hartsville, Society Hill, Timmensville,
Leavensworth, Wood Shop.

Edgefield District.

Bath, Fruit Hill, Oakland,
Beech Island, Germanville, Parks',
Big Creek, Graniteville, Perry's Cross Roads,
Cairo, Grove Hill, Phœnix,
Cold Spring, Hamburgh, Pleasant Lane,
Coleman's Cross Roads, Higgin's Ferry, Poverty Hill,
Colliers, Ivy Island, Rehoboth,
Dorn's Mill, Kirksey's Cross Roads Richardsonville,
Duntonsville, Longmire's Store, Ridge,
Dyson's Mills, Lott's, Shatterfield,
Edgefield C. H., Meeting Street, Sister Springs,
Edisto Mills, Mine Creek, Tucker's Pond,
Elton, Mount Willing, West Creek,
Woodlawn.

Fairfield District.

Alston, Gladden's Grove, Ridgeway,
Bell's Store, Jackson's Creek, Rocky Mount,
Brown's, Lilesford, Shelton,
Buck Head, Long Lun, Strother,
Doko, *Monticello*, (c. h.,) Winnsboro',
Feasterville, Yonguesville.

Georgetown District.

Georgetown, (c. h.,) North Santee, Yanhanna.
Rhyme,

Greenville District.

Buena Vista, Gowensville, Merrittsville,
Cedar Falls, Grove Station, Milburg,
Chick's Springs, *Greenville*, (c. h.,) Milford,
Clear Spring, Highland Grove, Mush Creek,
Cottage Hill, Highway, Plain,
Cripple Creek, Huntersville, Pleasant Grove,
Dublin, Lavinda, Pliny,
Dunklin, Lickville, Sandy Flat,
Fairview, Lima, Sterling Grove,
Fountain Inn, Line Creek, Traveller's Rest,
Gilder, Marietta, White Horse,
Golden Grove, White Sand.

Horry District

Blanton's Cross Roads Bug Swamp, Dogwood Neck,
Bucksville, *Conwaysborough*(ch) Little River.

Kershaw District.

Anniedel, Flat Rock, Red Hill,
Bee Tree, Hanging Rock, Russell Place,
Camden, (c. h.,) Liberty Hill, Tiller's Ferry.
Lynchwood,

Lancaster District.

Belair, Dudley, Lancaster C. H.,
Butler, Flint Ridge, Longstreet,
Craigsville, Hickory Head, Pleasant Hill,
Cureton's Store, Jacksonham, Pleasant Valley,
Dry Creek, Wild Cat.

Laurens District.

Bluff Rabun, Laurens C. H., Power's Shop,
Brewerton, Marengo, Reynosa,
Centreville, Martin's Depot, Scuffleton,
Clinton, Milton, Simpson's Mills,
Cold Water, Monroe, Spring Grove,
Cross Hill, Mount Gallagher, Tumbling Shoals,
Eden, Mount Pleasant, Tylersville,
Highland Home, Mountville, Waterloo,
Huntington, North Creek, Young's Store.
Pleasant Mound,

Lexington District.

Beaver Pond, Hollow Creek, Rish's Store,
Clark's Ferry, Hope Station, Rockville,
Clark's Mills, Leesville, Rocky Well,
Countsville, Lexington C. H., Sandy Run,
Dean Swamp, Long Hollow, Sawyer's Mills,
Draft's Mill, Oakville, Steedman's,
Edisto, Pleasant Spring, Williamson's Mills.

Marion District.

Allen's Bridge, Friendfield, Mullin's Depot,
Britton's Neck, Gilchrist's Bridge, Oak Grove,
Campbell's Bridge, Gum Swamp, Oakton,
Catfish, Jeffrey's Creek, Peedee,
Centenary, Little Rock, Red Bluff,
Effingham Station, Lynche's Creek, Reedy Creek,
Ella's Grove, Marion C. H., Selkirk,
Flintville, Mar's Bluff, Sugar Hill,
Floydsville, McInnis Bridge, Temperance Hill,
Forestville, McQueen, Willow Creek.

Marlborough District.

Adamsville, Brightsville, Parnassus,
Bennetsville, Brownsville, Powell's Store.
Clio,

Newberry District.

Beth Eden, Jolly Street, Newberry C. H.,
Belmont, Kinnard's Turnout, Pomaria,
Chappel's Bridge, Liberty Hall, Prosperity,
Cotswood, Little Mountain, Saluda Mills,
Glymphville, Long Pond, Shop Spring,
Indian Creek, Maybinton, Walton,
Jalappa, Mount Bethel, Whitmires.

Orangeburgh District.

Branchville, Jordan's Mills, Rowe's Pump,
Bull Swamp, Kitching's Mills, Saint Matthews,
Fort Motte, McCantsville, Vance's Ferry,
Halfway Swamp, Orangeburgh C. H., White Cane,
Jamison, Poplar, Willow Swamp.

Pickens District.

Anderson's Mills, Fair Play, Pickensville,
Arnold's Mills, Five Mile, Salubrity,
Bachelor's Retreat, Flat Shoal, Snow Creek,
Bounty Land, Fowler's Creek, Sunny Dale,
Branch Island, George's Creek, Symm's Mills,
Cain Creek, Glassey Mountain, Table Mountain,
Camp Ground, Holly Spring, Toxaway,
Cheohee, Horse Shoe, Tunnel Hill,
Claremont, Long Creek, Twelve Mile,
Clayton's Mills, Martin's Creek, Walhalla,
Colonel's Fork, Maxwell's Mills, Warsaw,
Dacusville, Nine Times, Whetstone,
Eastaloe, Oakway, White Hill,
Eighteen Mile, Oconee Station, Wolf Creek.
Pickens C. H.,

Richland District.

Cedar Creek, Gadsen, Hopkins Turn Out,
Columbia, (c. h.,) Wateree.

Spartanburgh District.

Algood, Crawfordsville, Moultre,
Arrowood, Cross Anchor, Mount Lebanon,
Barleywood, Crowsville, Mountain Shoals,
Batesville, Damascus, New Prospect,
Bivingsville, Earlesville, Poolsville,
Boiling Springs, Enoree, Reidsville,
Briantsville, Fingersville, Roger's Bridge,
Buck Creek, Fort Prince, Smith's Store,
Burnt Factory, Glen Springs, Sparta,
Campobella, Grassy Pond, Spartanburgh C. H.,
Cannon's Store, Hebron, Templeman's Mills,
Cashville, Hobbysville, Valley Falls,
Cedar Springs Asylum Hurricane, Vernonsville,
Clarksville, Jackson Hill, Wallace's Factory,
Cowpen Furnace, Limestone Springs, Walnut Grove,
Cowpens, Millville, Woodruff's.

Sumter District.

Bethlehem, Harmony College, Privateer,
Bishopville, Lynchburgh, Providence,
Black River, Manchester, Salem.
Bradford Springs, Mayesville, Shiloh,
Bradleyville, Mechanicsville, *Statesburgh*, (c. h.,)
Brewington, Mill Grove, Sumter,
Flowerton, Packsville, Taylor's.
Plowden's Mills,

Union District.

Cedar Bluff, Goshen Hill, Pacolett Mills,
Cold Well, Gowdeysville, Simsville,
Coopersville, Jonesville, Skull Shoals,
Cross Keys, Kelton, Timber Ridge,
Draytonsville, McDuffie, *Unionville*, (c. h.,)
Fair Forest, Meansville, West's Spring,
Fishdam, Mount Joy, Wilkinsville.
Mount Tabor,

Williamsburgh District.

Black Mingo, Indiantown, Natural Grove,
Camp Ridge, Johnsonville, Plantersville,
Cedar Grove, *Kingstree*, (c. h.,) Potatoe Ferry,
Deer, Lenude's Ferry, Singletarysville,
Gourdines, Lynche's Lake, Tisdale,
Grape, Murray's Ferry, Vine.
Myersville,

York District.

Allison Creek, Coate's Tavern, New Centre,
Antioch, Ebenezerville, New House,
Bethany, Fort Mill, Rock Hill,
Bethel, Grand Hill, Sharon Valley,
Blairsville, Guthriesville, Smith's Ford,
Boydton, Harmony, Smith's Turn Out,
Bullock Creek, Hickory Grove, Taylor's Creek,
Cherokee Iron Works, Hopewell, Tirza,
Clark's Fork, McConnellsville, *Yorkville*, (c. h.,)
Clay Hill, Meek's Hill, Zeno.

THE ORIGIN OF COAL MINES.—*Editor London Mining Journal*—Sir: I am glad to see that Mr. S. B. Rogers has broached a new theory on coal formation. I admit it is one far more feasible than either the turf bog or tree formation; still there is a something about it that wants explaining. First, as to the ropes that anchored on the masses till gravitation sunk them all in succession over each other,—then, what held on the sandstone, shale, and ironstone, and brought them down on the same spot? By what electric action does Mr. Rogers mean to show the sandstone formed under; he bearing in mind they had to play this game some twenty or fifty times over? If he can show that the sandstone, shale, and ironstone formed under any electric action, and collected from attraction or affinity, I must ask him to show why coals should not be formed under the same law? I see no necessity for Nature to first pass coals through a process of fish and sea-weed to form coals after? I think Mr. Rogers will admit sea-weed, fish, and all the things he named, are gathered from the raw materials, and have passed through one, or, for what I know, ten processes, after its first start from nature. I really cannot see why coal should not be formed where it is found, as well as the adjoining rock: I see no necessity for its first being grown as sea-weeds to ultimately become coals. If Mr. Rogers can show that weeds formed each adjoining layer of stone, and what weeds they were, and particularly the weeds that formed the layers of iron, and how they managed to place themselves so nicely over each other, he will confer a boon on the public, and a pleasure to me. Hitherto, I can see nothing to convince me that coal, ironstone, shale, and sandstone, did not form, as Mr. Rogers has stated, from electric action and affinity. Where they are now found some of them may not be a thousand years old. More on this subject after I finish my letters on hand. NICHOLAS ENNOR.

WATER-WORKS OF AMERICA.

CINCINNATI, OHIO.

We have received the annual report of the Trustees of the Cincinnati, Ohio, Water-Works for the year ending December 31, 1861. The following remarks on the mode of assessment will interest our readers, as it is a step towards a more equitable arrangement than has been heretofore adopted.

With a view of ultimately equalizing the water tax on all who received benefit from the works, the Board, two years since, recommended the assessment of ten cents per front foot on all the property fronting on the lines of pipes already laid down, which, being adopted, has partially relieved the overtaxed; but is yet not equitable in its workings, inasmuch as the unimproved property, worth not more than ten dollars per front foot, is taxed as heavily as the improved property which, with the improvements, may be worth two thousand dollars per foot.

To show the inequality of the present mode of assessment per front foot, it is only necessary to refer to one comparison in the expense of insurance. The risk and consequent expense of insuring property in Cincinnati is reduced at least one-half, by the facilities for extinguishing fires afforded by the Water-Works, for which no merchant or insurance company, as such, pays one dime.

"Take, for example, a building on Fourth street, occupying sixty feet front on the pipe—for which the owner pays six dollars water tax only—worth, including the stock of goods, say sixty thousand dollars. At present rates the insurance would amount to six hundred dollars per annum, whereas without the benefit of the Water-Works, he would be compelled to pay twelve hundred dollars. Is it not evident from this that the owner of the property enjoys a benefit of six hundred dollars for which he pays only six?

"Take another piece of unimproved property in the suburbs, of sixty feet front, worth say six hundred dollars, on which the owner pays for water tax ten cents per front foot, what benefit does he derive from the Works for the six dollars per annum which he pays?

"With a view of equalizing this matter, as the Board cannot consistently recommend any further assessment on the front foot principle, they recommend that, for the purpose of placing a proper portion of the burden on the property benefited, that the city assume the payment of the interest on the bonds issued for the purchase of the Works, and create a sinking fund to meet the principal when it becomes due, thereby relieving the consumers from the burden of a debt which was incurred for the benefit of the whole city, and which should, in simple justice, be borne by all.

"A few other reasons influencing this recommendation may not be improper. But, to fully explain, it will be necessary to briefly review the history of the Works, from their purchase by the city to the present time. Without going into detail, we may briefly state that the Works were purchased by the city, payment being made in bonds bearing six per cent. interest, to which may be added the amount since borrowed by the city for the purpose of building new engines and enlarging the reservoir, making the whole indebtedness eight hundred and seventy-five thonsand dollars.

"The estimated value of the Works at this time is two million three hundred and fifty thousand dollars, which is a clear profit over the indebtedness of one million four hundred and seventy-five thousand dollars, and which has been entirely drawn from the pockets of the consumers, with the exception of about forty-two thousand dollars, derived during the past year from the water-tax.

"During the entire time the Works have been owned by the city the consumer has been made to pay, in water rents, the interest on the original cost, the expense of extending pipes, the cost of additional pumping and reservoir capacity, and the general expenses for the repairs and management of the Works, while the personal property in the city, the millions worth of goods in warehouses and stores, the valuable business and other houses, all of which are protected from fire by the Works, do not contribute one cent.

"By reference to the Annual Report of the City Auditor we find the value of the real estate of the city is assessed at over sixty millions of dollars, and the personal property over thirty millions. Assuming that one-half of the valuation of the real estate is for buildings, liable to be destroyed by fire, and we find that the Works afford adequate protection to, at least, sixty million dollars' worth of property free of charge to the owners; and, at the same time, effecting a saving to them in the rates paid for insurance (as shown in the example previously cited) of a sum infinitely greater than the cost of the management of the Works, interest and everything else included. Our fire department is maintained at an expense of over one hundred thousand dollars annually from the general fund, while the essential element, which gives it all the efficiency it possesses, is furnished at the expense of the private consumer. While one, therefore, is the auxiliary of the other, and *neither* could of itself afford the protection to our property required in case of fire, it strikes us there is as much justice in making all species of property contribute its quota in the one case as in the other.

"Our fire department is an institution of which we all feel proud. No objections are urged by the tax-payer against contributing his proportion to maintain its efficiency, and yet a large amount of property is taxed for its maintenance which cannot, in its present condition, derive any benefit whatever from it. The same argument will apply to the gas tax and many others now levied by the city. The wisdom of man has not yet arrived at any mode of taxation which will be just and equitable *in all* its provisions, and especially is this the case in corporations like Cincinnati, where all must contribute more or less to the general good and welfare of the city.

"Should our suggestions meet with your concurrence, by 1864, at farthest, the water rents can be reduced fully fifty per cent., if not more, to families, and to large consumers, nearly sixty-six per cent. on the present rates. Water is a necessary of life, and should be furnished to the consumers as at nearly the cost of delivery to his premises as possible. They should be taxed no more than enough to keep up the general expenses of the Works; and by the means suggested the object can be accomplished."

The above remarks which we have quoted, are addressed to the City Councils of Cincinnati, and they doubtless will be favorably acted upon, as the equity of the recommendation must be apparent to all.

In the report of the Superintendent of the Works, the following is given as representing the financial condition of the Works:

Total receipts, including the balances on hand January 1st, 1861, have been	$238,305 29
And the total disbursements	221,025 08
Leaving a balance on hand at this date of	$17,280 21

Of the above amount there has been disbursed in the *ordinary expenses* of the works, which includes the

Pumping service, shop and reservoir accounts, repairs to the street service, expenses of the hydrant service, office expenses and salaries, interest on water works bonds, and the per centage for collecting water rents, and rents returned in office	$101 631 35
Amount paid on note due the city	13,361 03
Amount refunded to consumers, under the resolution of the Board, for the relief of manufacturers whose establishments have been partially closed, owing to the stagnation of business during the past season	1,579 57
Amount refunded of the special tax for water purposes, erroneously assessed on the county duplicate	245 15
Making a total of	$116,817 10

—Properly chargeable to expense account.

The remainder of the disbursements have been made with a view to enhancing the efficiency of the works, as follows:

For the extension and enlargement of the street distributing mains	$42,534 99
Amount paid on account of the new engine, now being constructed	39,737 24
Amount paid on account of the new building for same.	21,935 75
Total	$104,207 98

In extending and enlarging the distributing mains during the past year the following amount of pipes have been laid:

6,273	feet of	twenty-inch	pipes.	
3,126	"	ten	"	"
760	"	six	"	"
6,567	"	four	"	"

Total..16,726 feet of pipes, together with the necessary valves and connections.

In the amount above stated, as charged to extension of the street service, the sum of nine thousand dollars is included, which would be properly chargeable to the next year's business, being the amount advanced to Messrs. T. G. Gaylord & Co. on account of the forty-inch pipes ordered some time since, but not yet delivered, and for which the works hold ample security. There are, however, claims not yet adjusted, for work done in the past season, amounting to, perhaps, six thousand dollars, chargeable to this account. These items, together with such portions of the work done for the street service, in fitting up the valves, &c., &c., and embraced in the shop account, will make the total cost of sixteen thousand seven hundred and twenty-six feet of pipes laid this year about forty-one thousand dollars.

The repairs account for street service, it is stated, largely exceeds the estimate made for this branch of the service by R. C. Philips, Esq., the former superintendent, in his report at the close of the last fiscal year. This has been, in great part, caused by the break of the Deercreek sewer, in August last, by which a large portion of the twenty-inch main on Third street was washed away; and in repairing which the whole of the line of pipe, from the Canal to Butler street, has been raised to conform to the newly-established grade of the street.

The receipts of the works during the past year present a very gratifying result, and although the collections from water rents have been twelve thousand one hundred and eleven dollars and fifty-three cents less than the receipts from the same source for the previous year, they fully justify the policy of the Board in the very liberal reduction of the rates to consumers, which has characterized the administration for the past two years.

In connection with this subject it may be interesting to institute a comparison between the percentage of the reductions made in the rates, and the proportionate loss of receipts sustained by the Works. The reduction of rates taking effect January 1st, 1860, was equivalent to thirty per cent. to manufacturers, and twenty-two per cent. to families. In July of the same year a still further reduction was made, equivalent to twenty-five per cent. in the rates to manufacturers, and eleven per cent. in the rates to families, while the deficiency in the receipts for water rents, as stated in the last report of the former superintendent, amounted to but little over three and two-thirds per cent., as compared with the receipts of the previous year. The very meager loss sustained by the Works he accounted for in the fact that a revision of the estimates of the *quantity of water* used by the manufacturers resulted largely in increasing the *amount paid* by the large consumers, though the *rates* had been so materially reduced.

A new schedule of rates, taking effect April 1st, 1861, has been applied to three-fourths of the bills collected during the year just closed, the reduction being equivalent to eight per cent. to manufacturers, and twelve per cent. to families.

A revision of the estimates of the amount used by manufacturing consumers, resulted generally in a *reduction* of the amount previously assessed, and although there have been a few isolated cases in which the assessments have been increased, they have proved almost solitary exceptions to a general rule.

The difficulty in correctly estimating the amount of water used in the almost infinite variety of manufacturing business carried on in Cincinnati is acknowledged, and the value of the water-meter recognized as the proper method. The only true mode of arriving at a correct assessment, is by an universal application of reliable meters. All consumers would then pay for a close approximation to the amount used, and no more. The enormous waste of water attendant upon the present system would then be either stopped or paid for, and the Works would be enabled to furnish the supply to all, at a proportionately reduced rate.

In comparing the receipts of the present year with the last, it must be borne in mind that this season has been characterized by an almost utter prostration of the manufacturing interests of the city, whose trade has been principally with the South, the Southern markets having been most effectually closed by the rebellion now raging. When viewed in this light the wonder is, *not* that the receipts of the Works have been

slightly diminished, *but* that they have not suffered much more severely.

The promptness which has characterized the collections of water rents during the past season affords ample proof of the diligence and energy of the collectors in the various districts, and of the efficient manner in which they have discharged all their duties.

In estimating the receipts for the coming year, on account of the disturbed condition of trade, Mr. Earnshaw, the superintendent, has deemed it best to make a low estimate, and assumes that the

Receipts from water rents will, at least, be	$130,000 00
Proceeds of special tax	42,000 00
Balance on hand, January 1st, 1862	17,280 21
Total estimated receipts	$189,280 21

The ordinary expenses for the coming year are estimated to be—

For interest on water works bonds	$53,000 00
Running expenses of the works, including the pumping and hydrant services, office expenses and salaries	38,000 00
Repairs to street service	2,000 00
Commission on collection of water rents and inspection of hydrants	4,000 00
There will also be required—	
For the enlargement of the distributing main, from the reservoir to the junction of Eighth street and Broadway	35,000 00
For relaying the pipes removed in other locations	3,000 00
And for prosecuting the work on the new engine and engine house, all the funds that the Board may have at their disposal, say	50,000 00
Total estimated expenditures	$185,000 00

—And the balance on hand January 1st, 1863, would be about four thousand two hundred and eighty dollars.

It is impossible to estimate the amount of pipes that may be required during the coming season in those portions of the city that are at present not supplied with water from the Works. Should, however, the demand be even largely in excess of present anticipations, the amount of pipes that are now on hand, together with those that will be removed in the revision of the principal distributing pipes already laid, will preclude the necessity of purchasing any of the smaller-sized pipes for a long time to come.

Should the finances of the Works permit any considerable revision of the street pipes during the coming season, it is trusted that the next annual report will contain gratifying evidence of a full supply in those portions of the city so remote from the head waters of the reservoir, that although, under the present system, the water will *flow to* those localities, it comes with such a sluggish force as to be almost useless to the consumer, and subjects him to the necessity of watching during the night time for an opportunity to fill his cistern when the draft of his more favored neighbor is shut off. It will not be denied that such a condition of affairs calls loudly for redress. The practice heretofore adopted, of indefinitely extending, both in length and number, the *veins* through which the water flows, to supply the constantly increasing number of hydrants, (which already number 12,830,) without a corresponding increase in the size of the *arteries* leading from the reservoirs, is regarded by Mr. Earnshaw as an unaccountable oversight, which a little reflection on the part of those having the work in charge must certainly have prevented; and if the hydraulic engineer, in arranging the pipes for the water supply of all large cities, would carefully examine the works of "Him who doeth *all* things well," as exemplified in the arterial system of the human frame, he will find that he carries within himself the finest example that he can possibly follow.

It is mentioned in the report of the engineer, that during the past year the Works have been compelled to furnish sixteen million nine hundred and sixty-four thousand six hundred and twenty-four gallons more water than the average of the two preceding years; and although the aggregate amount for the year has been less than the total for 1860, the first six months consumption for 1861 largely exceeded the demand for the corresponding months of the preceding year.

This condition of affairs, occurring during a season when the establishments of many of the largest manufacturing consumers have been either partially or wholly closed, is clearly attributable to leakage and waste, and demands serious consideration. Any remedy that can be applied to abate the evil will redound both to the benefit of the Works and the consumers, who seem to fail to comprehend that, in permitting unnecessary waste, they are robbing themselves, and that all the economy they may exercise will result in a proportionate saving of the amount they, as consumers, must pay for this indispensable necessary of life.

The amount of water supplied to the reservoirs during the past year, amounted in the aggregate to one billion seven hundred and seventy-two millions two hundred and sixty thousand six hundred and forty-eight gallons, showing an excess of supply over the average of the two preceding years amounting to sixteen millions nine hundred and sixty-four thousand six hundred and twenty-four gallons.

	Total Gallons Delivered for the Month.	Daily Average Gallons throughout the Month.
January	131,099,358	4,229,011
February	121,573,937	4,341,926
March	147,322,094	4,752,325
April	143,457,873	4,781,929
May	158,443,480	5,111,080
June	161,258,837	5,375,127
July	181,201,695	5,845,215
August	128,026,357	4,129,882
September	155,701,032	5,190,034
October	151,029,507	4,871,919
November	145,286,975	4,842,899
December	147,864,499	4,769,822

The average daily supply for the year 1861 amounts to four millions eight hundred and fifty-five thousand five hundred and eight gallons, while the daily average of the years 1859 and 1860 combined shows the amount to be four millions eight hundred and nine thousand and thirty gallons; showing a daily excess of supply for the year 1861 over and above the two preceding years of forty-six thousand four hundred and seventy-eight gallons.

In the report of the engineer, it is mentioned that the machinery and pumping apparatus is in fine working condition.

The following table will show the total amount of distributing and supply mains attached to the Water-Works at this date in feet and miles:

SUPPLY MAINS.

		Miles.
2,400	feet of twenty-inch suction and pumping mains	0.454
1,320	" seventeen-inch ascending mains to reservoir	0.250
760	" eight-inch descending mains to works	0.144
4,480	feet. Total	0.848

DISTRIBUTING MAINS.

32,998	feet of twenty-inch pipes	6 249
729	" twelve-inch pipes	.138
40,454	" ten-inch pipes	7.661
15,334	" eight-inch pipes	2.904
2,657	" six-inch pipes	.503
301,445	" four-inch pipes	57.091
55,141	" three-inch pipes	10.443
386	" two-inch pipes	.073
449,144	feet belonging to the works. Miles	85.062

There are also attached to the Works 2,485 feet of four-inch pipes located beyond the city limits, west of the Mill Creek bridge, and belonging to the Ohio and Mississippi Railroad Company, making the grand total of distributing and supply pipes attached to the Works 456,109 feet, or 86 38-100 miles.

REPORT OF THE ENGINEER

Describing the Character and Capacity of the New Pumping Engine.

Cincinnati, May 29, 1860.

To the Trustees of Cincinnati Water-Works:

Gentlemen,—In view of the positive approaching necessity for additional power for pumping service at the Works, it is deemed necessary to make the following recommendations with regard to the required capacity, power, and principle of the pump and engine necessary to meet the increasing demand for water consumption.

The sizes here given are adjusted to the holding of the required quantity uniformly in the reservoir, which is somewhat in excess of our present power, (which at times fails to accomplish this much desired object,) and can be made to supply about double the present power by running the engine to its maximum speed.

The pump to have a forty-six inch diameter of bore and twelve feet length of stroke, to have four branches cast upon the pump barrels of fifty inches diameter of opening, to which will be attached the four valve chambers, two for the receiving and two for the discharging side of the pump, (containing R. Hosking's treble-beat Cornish valves,) on the receiving side of which will be placed the vacuum sixty inches diameter, having four branches cast upon the same of the same dimensions as those upon the pump barrel; the base of this column to be firmly fastened to a foundation plate located below and contiguous to the lower receiving valve chambers; this vacuum column is brought in direct connection with the receiving valve chambers, making a permanent fastening with the pump, which is to be supported on a similar foundation plate, but of higher elevation. This column is carried sufficiently high above the upper branch to insure a perfect filling of the pump barrel during the motion of the pump piston, the replacement of the water thus exhausted being returned during the cessation of the pump strokes, produced by alternation.

The two branches on the south side of the vacuum vessel (or column) directly in line with those connected to the receiving valve chambers, are brought in union with two suction pipes, each fifty inches diameter in the clear and thirty-four feet in length, uniting with a three way branch pipe, two of the branches being fifty inches diameter in the clear and the other sixty inches, to which is attached a sixty-inch wrought-iron suction pipe, one hundred and eighty feet long, (more or less,) carrying at its terminus with the river channel a large cast-iron bell-mouthed quarter circle bend pipe, with a strainer on the face; this to be so fitted and arranged as to lay quartering and below the line of suction pipe and susceptible of being turned upward for the purpose of examination during the stages of low water.

Another sixty-inch column, with similar branches to those of the vacuum column with the corresponding foundation plate, will be attached to the discharge valve chambers of the pump, upon which will be placed the air vessel of sufficient capacity to insure an easy working of the pump valving.

The discharge pipes (two in number) of length and size of those used for the suction, will be brought in union in a similar manner with a three way branch pipe, to which will be attached the fifty-inch main leading to the reservoir.

The three way branches of suction will contain the necessary valving so arranged as to pump from the river channel through the sixty-inch wrought-iron suction pipe or take the water from the inside of the pump-room, which will be admitted by a simple arrangement of valving in direct connection with the aqueduct to be built directly over the line of suction pipe, and extended as near as practicable to the river channel without producing an interference with the river navigation.

By the foregoing arrangement of the parts of the pumping apparatus three distinct supporting unions of foundation will be attained, giving a system of support and security to the pump proper that has not hitherto been accomplished in any of the works falling under my notice, giving the most ample assurance of security against the thrust of the main, at all times tending to move the pump out of line.

The arrangement of the lines of suction and discharge pipes immediately in connection with the pump have been constructed with a view to an easy and constant flowage of the water passing through them, having no curvature whatever to contend with, except at the valve chambers, where ample capacity is given to prevent retardation and friction.

From the pump foundations will rise a series of plain columns secreted in the masonry, one pair of which will be used for supporting the slides for guiding the pump cross-head and piston-rod, the cross-head to be arranged to come in contact with the spring-checks, and also to carry the plug rods for working the steam valves and cut-off apparatus.

Above these slides will be placed the double-acting air-pump and condensing apparatus.

And immediately above upon a level with the engine-room floor will be placed the low steam-engine cylinder, one hundred inches diameter of bore with twelve feet length of stroke, with balance valves worked by one shaft, one lifter, and two lifting rods with a variable drop cut-off.

The whole to be built with a view to the most simple arrangement of the working parts and reducing the entire work to the most simple form extant, avoiding all attempts at display in the requisite finished portions of the machinery, at the same time keeping in

view strength and durability, with all the fittings done in the most reliable manner, at the same time avoiding, as far as practicable, all soft metals in the unions of the pumping apparatus.

The whole structure to have a sufficiency of strength of metal and bolting to insure safety in forcing the water from the river at low water to an elevation of not less than fifty feet above the present reservoirs.

In conclusion of the foregoing brief outline description of size, form, and principle, of a direct double-acting engine and pump, adapted to the present and future requirements of the Works, I deem it my duty to recommend that a commencement made be had at as early a day as practicable upon the patterns pertaining to the pump works, consisting of valving branches and foundation work.

The magnitude of this work, compared with work heretofore done in this city in the casting department, will require some preparation on the part of the party who may be awarded the work, a knowledge of which can be better obtained from patterns than otherwise.

Hoping your honorable body will give the foregoing your earliest attention, I remain, Yours respectfully,

GEORGE SHIELD.

WATER RATES.

The following statement will show the water-tariff, now in force at the Cincinnati Water-works:

OFFICE OF CITY WATER-WORKS,
February 5th, 1861.

At a special meeting of the Board of Trustees, held this day, it was unanimously

Resolved, That for all bills falling due on and after the first day of April, 1861, the following rates shall be charged and collected by the City Water-Works, to wit:

FAMILIES OCCUPYING		
Houses of 1 and 2 rooms	$3 50	per annum.
" 3 and 4 "	4 00	"
" 5 and 6 "	5 00	"
" 7 and 8 "	6 00	"
" 9 and 10 "	7 00	"
" 11 and 12 "	8 00	"
" 13 and 14 "	9 00	"
" 15 and 16 "	10 00	"
" 17 and 18 "	11 00	"
" 19 and 20 "	12 00	"
Houses containing more than 20 rooms, for each additional room	40	"
Houses occupied by more than one family—extra for each additional family	2 00	"
Boarding houses, [the following rates in addition to the above:		
Houses of 7 to 12 rooms, extra	1 50	"
" 13 to 20 "	3 00	"
" 21 to 30 "	6 00	"
" 31 to 40 "	12 00	"
Public baths, warm or cold	8 00	"
Private baths, warm	3 00	"
Private baths, cold	2 00	"
Water closets, in public houses	4 00	"
Water closets, in private houses	2 00	"

Urinals to be assessed.

Plugs or hose hydrants for washing sidewalks, $1 50 for each 25 feet front or less, and six cents for each additional front foot.

Corner houses and lots, to be charged at the same rate for both fronts.

Plugs for gardens and other purposes, to be assessed.

Barber shops, $1 50 per annum for each chair.

Livery and private stables, $1 50 per annum for each stall; for each carriage, buggy, or wagon, seventy-five cents per annum; for each horse-trough, $5 per annum.

Bakers, for each barrel of flour consumed, one-half cent.

Coffee-houses, from $5 to $20 per annum.

Restaurants and fountains to be assessed.

Stores, offices, and sleeping rooms, $1 to $8 per annum.

Smith shops, $1 50 per annum for each forge.

Brick-work, six cents per 1,000.

Plastering, two cents for each bushel of lime used.

Stone-work, two cents per perch.

Schools, Asylums, and Churches, $1 50 to $8 per annum.

Pork-packers, from $10 to $20 per annum.

Steam-engines to be assessed by the tables, according to the size of boiler, extent of fire surface, pressure of steam, size and velocity of engines, at the rate of twelve cents per 1,000 gallons, and an additional charge of $4 for every fifty hands employed, or the consumption to be determined by meter measurement.

Manufactories, hotels, distilleries, tanneries, slaughter-houses, breweries, and all other large consumers, to pay at the rate of twelve cents per 1,000 gallons, the amount of water to be determined by estimation of the superintendent or surveyor, or by the meter.

By order of the Board.

OFFICERS OF THE CINCINNATI WATER-WORKS, FOR 1862.

Board of Trustees,
B. T. STONE, *President,*
CHARLES RULE,
M. ECKERT.
Superintendent,
JOHN B. EARNSHAW.
Engineer,
GEORGE SHIELD.
Secretary,
J. M. HANSON.
Collectors,
District No. 1—G. B. WILLIAMS,
" 2—V. EICHENLAUB,
" 3—ALEXIS KEELER,
" 4—FREDERICK BLUMM.

THE WATER GAS.—Some inquiries have recently been made concerning the progress of the latest water gas improvement. We find the following notice of it in the Laconia (N. H.) *Democrat:*

About two months since, water gaswas introduced into this town, and has proved itself thus far a very good article for lighting purposes. All had formed an opinion concerning the Sanders Water Gas, and when Mr. H. G. Beatly, the Engineer of the works, came, and it was understood that he was to light the place, it was supposed that he could not succeed, but the result is alike satisfactory to the company, to the consumers, and to himself. We are now getting a brilliant light from gas made from steam and hydro-carbon. The works consist of a retort, scrubber, condenser, and steam boiler. The retort is in the shape of a boot, and weighs six hundred pounds, is set upright in a furnace, filled with charcoal, and heated to a bright red heat. This charcoal is for the decomposition of the steam which is let into the retort under about 60 pounds pressure. On the top of the brick-work is a box containing the hydro-carbon, which is fed into a syphon connecting with the retort. The syphon conveys both the oil and steam into the retort. The steam being brought in contact with the red hot charcoal is converted into carbonic-oxide and pure hydrogen, which is mixed with the gases from the oils. The gas is then passed into the scrubber, an upright cylinder about twelve inches in diameter, filled with coke, and while the gas is passing up, water is forced into the top; in this way the gas is freed from all tarry substances without lime purification. It now passes through the condenser, which is a series of upright pipes, which frees it from moisture, and delivers it into the receiver in as dry a state as possible. The Gas Company have expended a large amount of money in procuring a light which would give satisfaction, and we think they have accomplished the work, in the successful operation of the water gas.

Much praise is due to S. L. Leavitt, Esq., and also to Richard Gove, Esq., Agent of the Company, for their untiring exertions in accomplishing this object, and also to H. G. Beatly, the Engineer of the works.

PHENIC ACID.—M. Lemaire has investigated the nature of this substance—one of the numerous products of the distillation of coal-tar. In a paper read before the Academy of Sciences, he stated that anatomical specimens and animals might be preserved in a fresh condition in vessels smeared over on the inner surface with phenic acid, provided that the vessels are hermetically sealed so as to prevent the removal of the air contained in them. The bodies of animals injected with an aqueous solution of phenic acid, may be kept without any alteration in atmospheric air. In this manner, M. Lemaire says, the body of a man may be preserved at an insignificant expense. This acid is also useful as a curative in tinea, scabies, and other diseases. In the latter malady, acetic acid is added to the phenic acid for the purpose of enabling it to penetrate beneath the epidermis to the roots of the hair.

CARBURETTED GAS IN LONDON.

The London *Engineer* says, that at the last meeting of the city Commission of Sewers, Deputy Lott moved that it be referred to the engineer and the medical officer, to examine and report whether the light from the gas-lamps in the public streets was increased or diminished by the carburetting process recently applied to them, and whether the light thrown upon the footways was not, as he submitted it was, obscured by the shadow of the boxes containing the material used in the process. In the course of a discussion on this subject, Mr. Haywood, engineer to the Commission, read a letter addressed to him by Mr. Massey, secretary to the Great Central Gas Company, complaining that the Carburetting Company, in applying their process to public lamps within the city, were picking out a lamp here and there for the purpose, to the inconvenience of the company. Mr. Massey also stated that a few days ago, as the Carburetting Company's men were fitting one of their naphtha boxes to a lamp in Queenhithe, it exploded. This, he added, was the third accident of the kind that had occurred within the last three weeks. The directors of the Great Central Company had directed him to call the most serious attention of the Court to an instance of explosion in a bracket lamp in Harrow Alley. Had, he said, one of the numerous lamps fixed in the rear of the same premises ignited, instead of the lamp in question, the great probability was that, occurring as it did late in the night, the whole block of houses and buildings used as cattle-sheds, would have been burnt down. The owner of the property had made a communication as to the risk she was incurring, and expressing great fear and anxiety for the future. Dr. Abraham said probably the accidents referred to, which were exceptional, were due to mismanagement, and therefore preventible. At all events, they were not of a nature to induce the commissioners to abandon the carburetting process, by which a great saving of money was being effected in the public lighting, and which, he believed, would be eventually adopted over the entire metropolis. Mr. H. Lowman Taylor held that the saving of money was at the expense of light, for he had observed on a recent occasion, late at night, a sort of twilight gloom in places where the process was in use. Besides, it was obvious that the boxes containing the naphtha attached to the public lamps, threw shadows on the ground. Dr. Abraham said it was well known, long before the carburetting process was adopted, that at advanced hours of the night, there was always a paucity of gas, consequent upon the companies relaxing their pressure. The subject, on the motion of Deputy Harrison, was eventually referred to the General Purposes Committee, for deliberate inquiry and report.

PETROLEUM ITEMS.

OIL LOADED IN BOATS IN BULK.—The Oil City *Register* says that large quantities of petroleum are run into boats in bulk, and thus shipped to market, and thus refers to a recent "jam" on way:

"The Pond Fresh of Tuesday last was nearly as large as that of the previous week. A considerable 'jam' occurred at McClintockville Bridge, several boats were stove, and a large amount of oil was lost. Our readers at a distance will understand that when a bulk boat is sunk the oil is a total loss. When a boat loaded with barrels is sunk, the barrels generally remain on the boat until the water falls, and is then unloaded. Quite a large crowd of spectators were on the bridge at the mouth of the creek to see the sight. The boats came down very rapidly, and beyond a few immersions of excited boatmen on the bulk boats in petroleum, when struck by other boats, no accidents of moment occurred.

"The oil is run into a boat, and the boatmen have a small platform to manage their oars, made of, frequently, but a single plank. So it takes but a slight knock from another boat to tumble the steersmen into the oil beneath. About 200 boats came down, freighted with some 20,000 barrels of oil. The point from which the first boat started is about ten miles above the mouth of the creek. The pond fresh usually lasts about two hours, so our readers can imagine that boats came down rapidly—the boats on Tuesday last averaging nearly five men to a boat—nearly 1,000 men. Just think of that, reader, and you can form some idea of

the immense magnitude of the oil business of the Venango oil region."

This is certainly a novel mode of getting merchandise to market, and is another evidence of the facility with which human ingenuity adapts itself to circumstances.

THE OIL TRADE ON THE ALLEGHENY.—The number of boats engaged in carrying oil and empty barrels on the Allegheny river, is variously estimated. There are some fifteen steamboats and tows, of an average capacity of 800 barrels, and about three hundred flat-boats of all classes, of which two hundred are engaged in transporting oil from the wells to the mouth of Oil Creek. The balance are employed to carry the oil to Pittsburg, from whence it is shipped to the east and to Europe. The capacity of the boats employed on the Creek, will average fully 100 barrels each; those employed on the river, about 500 barrels each.

The steamers average about three trips a week, when the river is in good boating stage, and the tow-boats about two. It takes a flat-boat from three to four days to make the trip from Oil City to Pittsburg. Besides this, a large quantity comes down the river in bulk and rafts.—*Pittsburg Post.*

THE OIL REGION OF PENNSYLVANIA—ITS LIMITS AND ITS WELLS.—The *Oil City Register*, of May 15, comes to us brimful of oleagenous matter descriptive of the wells of the oil region, to each one of which a paragraph is devoted, by a reporter who visited the ground and gathered his data from the agents at the springs, whence nature copiously pours forth, in draughts pungently perfumed, a new source and substance of light and lubrication, at the very time that the scarcity of the whale threatened the oil market with short supply and high prices.

The report embraces all the territory that is now producing oil in the Venango Oil Region. This territory "extends some ten miles, on each side of Oil Creek, and is in no place over half a mile in width, and there is not over one-third of even this territory as yet developed." At the end of the report is the subjoined "recapitution:"

"Number of wells now flowing	75
Number of wells that formerly flowed and pumped	62
Number of wells sunk and commenced	358
Total	495
Amount of oil shipped	1,000,000 bbls.
Amount on hand to date	92,450 bbls.
Present amount of daily flow	5,717 bbls.
Average value of the oil at $1 per barrel	$1,092,000 00
Average cost of wells $1,000 each	495,000 00
Machinery, buildings, &c., from $500 to $7,000 each.	500,000 00
Total number of refineries	25."

—*U. S. Railroad & Mining Register.*

PHILADELPHIA, PA.—The new gas-holder in Ninth street, First Ward, intended to supply the southern section of the city with gas, has been brought into use, and the supply of gas will consequently be greatly increased in that locality. Heretofore, the supply has been unequal to the consumption in the southern wards. Where so many houses are furnished with an abundant flow, others could scarcely obtain enough to yield sufficient light. The new holder will entirely remedy these defects. The Chief Engineer calls the attention of those who will receive an excess of gas, and advises them to check the flow on their premises. The proper means to accomplish this, is to turn the gas almost entirely off at the meter, and then light one burner in the second story of the house. This will, of course, shed a very faint radiance. Then gradually turn the stop-cock of the meter until the burner displays a full, clear light, without any noise or rushing of the gas. This done, a sufficient flow of gas is on to supply three burners, in different parts of the premises.

BURSTING OF A RESERVOIR.—The London *Builder* says that the work of years at the new reservoir of the Oldham Water-works, Rochdale, England, has been spoiled by the giving way of the embankment. The cause of the catastrophe is not known. In the night, the lower part of one side of the embankment gave way, forcing up the superficial soil of the adjacent hills to a considerable height. The pecuniary loss will be little short of $40,000, although no damage has been done to person or other property. Had the catastrophe not occurred till after the receptacle had been filled, Milnrow would have witnessed a great flood.

NEW YORK CITY.—A correspondent of the *Times*, thus complains of the miserable dimness of the street lamps, of this city:

"How is it that New York cannot be as well lighted as Philadelphia, and other cities? Our citizens pay largely enough for it, in all conscience. Gas companies are under contract to furnish three feet of gas. For many years our citizens have been paying for three feet, and receiving the benefit of, probably, not more than two feet. We pay for light and ought to have it. A few facts and figures upon this subject would probably do good about this time. It is understood they can be furnished without much trouble."

[We have frequently alluded to the unsatisfactory condition of our city street lights, which are a standing reproach to all concerned in the management of them. Three feet burners are entirely to small. In Philadelphia, five feet burners are used, and although the lamp-posts are much farther apart than in this city, the streets present a much more cheerful appearance after nightfall. Another improvement, would be the adoption of meters on the public lamps, whereby the evils of the contract system would be avoided.—ED.]

THE OXY-HYDROGEN AND MAGNESIUM LIGHTS.—Some improvements have recently been made in the oxy-hydrogen light, which cannot fail to be of value to photographers. One objection to the employment of this light for photographic purposes, is the very feeble amount of chemical rays which it emits when evolved by the ordinary means. The earth lime is universally employed as the body which is to be rendered incandescent by the heat, and this is about one of the worst agents for actinic purposes, which could be employed. Mr. Fryer has lately been making a series of experiments with this light, with a view to determine what substance, when made incandescent, produces the greatest amount of light. He has operated on various salts of calcium, magnesium, strontium, barium, and also upon some other substances. The best results were obtained from magnesium compounds. The sulphate of magnesia, when baked, was found to yield a bright light, but was decomposed by the heat; and the sulphurous acid escaping, was very unpleasant. Calcined magnesia succeeded the best of all; but when the powder was used, the gases blew it away. When the powder was mixed with water and afterward dried, the cake was friable; and when the dry powder was pressed into a mould, by means of hydraulic pressure, the cake split up into laminæ, when subjected to the current of ignited gases. After many experiments with the materials in different proportions, it was found that sulphate of lime, one part, and calcined magnesia, two parts, mixed with water, and modeled into a cake, and dried, produced the best results. This, however, is not all that could be desired, as in time the cake becomes cracked and fissured by the gas. The illuminating power is exactly double that of lime, the ratio being, pressure and volume of gas being equal, as 54 is to 27. The experiments were conducted with oxygen, and the coal gas supplied to Manchester. The jet used was a form supplied by Mr. Dancer, a jet of oxygen being surrounded by an annular jet of the coal-gas. Mr. Dancer has further improved the jet by allowing the oxygen pipe to project beyond the hydrogen, and by not contracting the aperture of the hydrogen, or coal-gas pipe. At the last meeting of the Manchester Literary and Philosophical Society, Mr. Fryer exhibited this light; its effect is said to have been very striking.—*Photographic News.*

THE HULL, ENGLAND, WATER-WORKS.—A New Cornish pumping engine has been erected at the Stoneferry water-works, to supply Hull with water. The London *Builder* gives the following as the dimensions of the machine. The engine is of 220 horse power, has cost $42,500, and is from the works of Messrs. Hawks, Crawshay & Sons, of Gateshead-on-Tyne. The diameter of the cylinder is 85 inches; length of stroke of piston, 10 feet, 6 inches; diameter of plunger, 34⅝ inches; lengh of stroke 10 feet 6 inches. The pump will deliver at each stroke 427 gallons of water; and as the engine can be worked at the rate of ten strokes per minute, 4,270 gallons can be supplied to the town per minute, or 3,074,400 per twelve hours.

NEWBERN, N. C.—This place is lighted by rosin gas-works, and is under the management of Mr. E. R. Stanley. At the time of the surrender of Newbern to Gen. Burnside's victorious army, the first night after the battle the town was in total darkness. The commanding general immediately sent word that gas must be made and distributed as usual. The superintendent made some shuffling excuse, alleging the works to be out of order. The general, not to be foiled by such nonsense, detailed a squad of men to see his order enforced, when the company, finding out that no child's play would be tolerated, started the works forthwith. They have been in operation ever since.

A BANQUET IN A SEWER.—On Monday afternoon, May 5, at the invitation of Mr. Webster, the contractor for carrying out that portion of the metropolitan main drainage from Deptford to the outfall at Erith, the members of the Greenwich District Board of Works, and about 500 inhabitants of the locality proceeded to inspect the line of sewer previous to its being handed over to the Metropolitan Board. About twelve o'clock the company assembled in front of St. Alphage Church, Greenwich, the band of the Volunteer Rifles being in attendance; and the descent, which occupied some time, having been accomplished by means of a long ladder, a novel scene was presented. The immense archway of brick-work, the radius of which is struck from a centre of 5 ft. 9 in., giving 11 ft. 6 in. in the clear, or diameter, and of circular form, had been provided with a temporary floor for a distance of about one mile, and was lighted on both sides with lamps. The refreshment tables were abundantly supplied. The most interesting portion of the proceedings was the presentation of a testimonial from the inhabitants of Greenwich to Mr. Webster. The chair was occupied by Mr. Bristow, M. P., who presented the address to Mr. Webster, and observed that the sewer in which the large number before him were then assembled was, in his opinion, one of the greatest engineering works of modern times. A similar testimonial was presented to Mr. Jennings, agent to the contractor, who acknowledged the same in suitable terms. Several toasts were duly honored, and addresses delivered, and after remaining underground about two hours, the company ascended.—*London Express.*

STRANGE SPONTANEOUS COMBUSTION.—The Woodstock (C. W.) *Times*, reports a remarkable case of spontaneous combustion which occurred recently in that place. It appears that at the close of the day's business operations, the practice of the parties in whose premises the case happened, has been to rub the counter with linseed oil, leaving the oil to penetrate the wood, during the night, to be cleaned off in the morning. This is done with cotton rags, formed into a ball secured tightly. In the present instance, the rags or balls of cotton cloth, after use, were left on the end of the counter, unconnected with any substance that would readily take fire, and the only mischief that resulted, was the disfigurement of a portion of the counter.

But one of the two balls ignited. The inference is, that the one that burned, was rather more tightly tied. Had the premises been consumed, the origin of the fire would forever have remained a mystery. From this occurrence a lesson may be gathered, namely, that rags saturated with linseed, or in fact with coal oil, and allowed to remain in a compact condition, are liable to take fire. The rags in the case under notice, had not been long in use, and, with the exception of the oil, were free from any other substance.—*Am. Review.*

ARTESIAN WELLS IN ALGERIA.—M. Kind, the engineer of the artesian wells of Passy, has obtained two new successes in Algeria. In a well sunk at Haouch-Baraki, in the plain of the Metidje, at about 137 yards, a jet of water was met, giving 120 gallons a minute. The boring being continued to 154 yards, the supply of water was increased, and rose above the soil; its temperature was 77 degrees Fahrenheit. In another boring, made at Haouch ben Tallah, in the same plain, carried to about 220 yards, a fountain of water was likewise met with.—*London Review.*

A METER WHICH MANY POETS USE NOW-A-DAYS.—Gas-meter.—*Vanity Fair.*

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PROPRIETOR, JOHN B. MURRAY. | EDITOR, C. ELTON BUCK.

MONDAY, JUNE 2, 1862.

It has been observed in nearly all new inventions that although they may be of great value, and the discoverer of them be entitled to substantial rewards, yet much of what is supposed to be novel is only the application of an old idea, and as such does not possess that claim to originality which would otherwise be awarded to it. Almost every improvement bears such a connection with something which has preceded it, and when the chain of relationship is carefully studied, the strong resemblance between them may be seen. Though this general statement may be true, and though the inventor of a new process or application may be greatly indebted to former methods of operation where the germ of his ingenuity originated, yet he is none the less entitled to credit for the permanent establishment of a system, even if others had explored in the same direction and left their task crude and unfinished. This has been fully proved in many instances, and examples are familiar to all, where, upon the announcement of new inventions, while the projector receives substantial tokens of public appreciation, there are in very many instances persons who entirely dispute his claims, and aver that they had forestalled him by previously announcing similar ideas. Thus, we have seen the electric telegraph, the reaping machine, COLT'S revolver, many processes connected with gas-making, the manufacture of coal-oil, the gas-meter, and last of all Mr. ERICSSON'S revolving turret on iron-clad war steamers, all claimed as original with other parties than those who perfected them, and gave them to the public. These are but a few of the many instances where conflicting claims to originality might be mentioned, but they will serve as types of a class which is very large, and are but specimens of what inventors in every age may expect.

With regard to inventions generally a very gross error exists in the public mind, and is exhibited even among those whose intelligence should prompt a different view of the subject. With some the mere conception of an idea is regarded as an invention; and no matter whether it be allowed to remain dormant for years, if some more energetic experimenter conceives the same subject, and by his industry and close application succeeds in developing it, the one to whom it originally occurred is not slow in endeavoring to divert the credit of the matured invention from the successful projector, to whose assiduity and labor alone the fruit of the idea is due. We do not pretend to deny that in some instances injustice has been done to inventors by those who have pirated the fruits of their labor, and reaped the reward to which others were entitled; but this seldom happens. The injury is generally on the other side; and the man who brings forward a really valuable improvement may always expect attempts to detract from his merits, and to claim the rewards he may justly deem his own.

On page 296 of this volume, we referred to the conflicting claims of several inventors, respecting the use of oxide of iron as a purifiying agent in gas-making. Although this substance was invented and patented at a very early period in the history of gas-lighting, yet it has been patented over and over again. This repetition of its application, however, did not render the recent patents void. On the contrary, the decision of the Lord Chancellor in the case of HILL *vs.* EVANS was in favor of one of the later patentees, and his decision was made after such reflection and study, as demonstrated to him that although in general terms the substance was old, yet the invention as described in the patent in question was new, and therefore not an infringement, or an appropriation from another inventor. An instance of a somewhat similar nature may be cited in the JAMES YOUNG coal-oil patent case, about which so much has been written and so little understood in a technical sense. It was alleged that the process of Mr. YOUNG was old and had been followed before, and that as oil had been distilled from coal for many years, there could be no novelty or originality in his invention. This being a case of considerable importance, much litigation ensued, and in the arguments which followed, the novelty of the process of Mr. YOUNG was clearly shown. His invention did not consist in merely extracting oil from coal for that was old, and well known; but where others had contented themselves with working in a crude way, with no uniformity or reliability in their results, Mr. YOUNG set about carefully studying and experimenting, until he arrived at the pith of his discovery, which was that by close attention to details, and maintaining the temperature of his retort at a certain degree, and laying down such minute directions as to all the minutiæ of the process that no one could misunderstand it, or fail to accomplish their object, the value of his discovery was recognized. These points, which are all important to the manufacturer, and which were not known before, constitute the value of his invention, and endow it with a character for novelty and originality which has stood the test of law, despite the contrary opinions of well known chemists, who, although eminent authorities in their profession, are not experts in patent law.

It has been lately suggested in England that illuminating gas may be employed in carburetting iron and thus converting it into steel, and many persons have supposed this application of carburetted hydrogen to be entirely new. This, however, has been suggested before, and patents have been obtained for the production of steel in this way. The earliest patent for this design was obtained in 1825 by MACKINTOSH, whose specification contains the following language:

"By this invention every kind of metallic iron may be converted into steel. The gases or vapors suitable for this purpose may be those obtained by the well-known means of producing gas by the distillation or decomposition of pit-coal, oil, or such other substances, whether of a mineral, vegetable, or animal kind, as are capable of affording carburetted hydrogen in its various forms; and consists in bringing such gases or vapors in contact with malleable iron at a high temperature, and which may be accomplished by the means hereafter specified, as employed in preference, &c."

Another patent for "Improvements in the manufacture of steel and gas," was obtained by DICK, in 1850, in which directions are given for the manufacture of steel and gas at the same time, by placing bars of iron together with coke and the coal to be carbonized, in the same retort.

In 1855, BELLFORD obtained a patent in England for "Improvements in manufacturing lighting and heating gases," in which water-gas enters into the process. The specification of Mr. BELLFORD is in part thus expressed:

"* * First, in generating carburetted hydrogen, by throwing at once a large quantity of coal into a well closed furnace [or cupola], which contains incandescent coke.

"Second, by continually dropping into the furnace [or cupola] and through a suitable aperture, a jet of coal powder from a chamber, which is supplied with the same by means of a funnel and a cock, adapted to it for this purpose.

"Third, by letting a jet of steam saturated with tar, or any other hydro-carburet, down through a layer of incandescent coke.

"Fourth, manufacturing hydrogen gas, by letting pure or hydro-carburetted steam through the smelted iron, which is thus transformed into iron of superior quality or into steel."

From these extracts it will be seen that the idea of using carburetted hydrogen gas in the manufacture of steel is not new, it having been proposed by the patentees above named. Although theoretically it is admirably proper for the purpose, we are not aware of any extended application of it having been adopted. The plans heretofore proposed for its employment are not well suited to general use, and have been objected to for many reasons. Yet if some ingenious experimenter should ever be fortunate enough to devise a means of applying illuminating gas to the manufacture of steel, which would be economical and reliable, and be generally adopted, the originality of his invention would undoubtedly be questioned, and others would endeavor to claim the rewards for having suggested the bare idea, which none could follow without further experiment and study.

WASTE OF WATER.—Many instances of a wanton waste of water occur in the experience of engineers, which, in the present manner of assessing consumers, seem irremediable. The following examples of this extravagance occurred in Detroit, Mich., and are taken from the last annual report of the Secretary of the Board of Water Commissioners.

"Some water-takers manifest a strange indifference to the waste of water going on on their premises, and suffer leaks to continue indefinitely, if they can procure the requisite supply. Unmindful of the fact that a moral wrong is the same whether committed against the public or an individual, they do not seem to care at what cost to the public, in excess of the amount they pay, the supply is furnished. In one instance, a five-eighth of an inch stream of water was found running steadily into a water-closet, which was situated in a dwelling over a store. On inquiry, the occupant stated that it had been running all summer, and that it had been allowed to do so by direction of the owner of the premises. A five-eighths pipe, under an ordinary head, will discharge about 300 gallons of water per hour, or 7,200 gallons per day, and more than 2,000 barrels in three months, for which the party paid seventy-five cents.

"Another instance of this careless indifference and wanton waste came to light the past season, accidentally, by the falling in of a sewer. Where a building had been removed about four years ago, the hydrant was taken up without first shutting off the water, and a five-eighths of an inch stream of water had been running to waste into a sewer, discharging during the time about 10,000,000 gallons—equal to four days' consumption of the entire city."

[In the ordinary loose and inaccurate way of assessing water-rates, even the most vigilant care on the part of water-companies is inadequate to check the mischief here complained of. Had water-meters been attached to the premises above-mentioned, it would have been impossible for such a waste to have occurred. If all such wanton waste could be brought to light, it would be found that a very large proportion of the money invested in reservoirs and distributing apparatus, is sunk and rendered useless by the enormous waste resulting from indifference or wilfulness. Can a stronger argument be found for the importance of the water-meter?—ED.]

ANSWERS TO CORRESPONDENTS.

A. L. T., of Md.—*We are not aware of any change having taken place, and think your informant must have been wrong. The first parties you name are the ones to whom to apply, and your request will doubtless be granted.*

J. G. G., of N. Y.—*Your communication is received, and your request will be attended to. We sent you full particulars by mail, which you should have received prior to the date of your last letter.*

G. E. S., of Pa.—*The journal you refer to is a weekly publication, but is also issued in monthly parts. In this country the monthly parts are generally received.*

O. P. Q., of Canada East.—*You will find the subject of the flow of gas through pipes very ably discussed in Mr. Hughes's work on coal gas, where a large space is given to it. Your ideas may be novel, but we have not had leisure to examine them, and cannot therefore express a decided opinion.*

B. H. L., of Ill.—*You would find a good gas regulator of great service to you, and would doubtless experience a large saving in your gas bills if you would use one. It would not do for us to say which of the many patterns is the best. They have nearly all been advertised from time to time in the* JOURNAL, *as may be seen by a reference to our preceding volumes.*

L. F., of Ohio.—*The enormous consumption of kerosene oil for illuminating purposes will of course affect to a very serious extent the manufacture of adamantine candles. It has done so already, and the prospects are that, with the increased production of this oil, and the consequent reduction in price, the quantity of candles used will grow much less. Many collateral branches of industry will suffer, as well as the manufacture of candles.*

P. K. F., of Wis.—*We have some time before answered a a query similar to the one you now propound. The largest gas-holder in America is at the Philadelphia Pa., Gas-works. It is* 160 *feet in diameter and* 95 *feet high. There is another gas-holder in Philadelphia which is* 140 *feet in diameter and* 70 *feet high, capable of containing over one million cubic feet.*

B. A. P., of Mich.—*We are pleased to hear of your success, and will be glad to hear of any new results you may obtain in your labors.*

W. B. G., of Pa—*The greatest opponent of gas now, as well as of all other illuminating agents, is kerosene oil. If consumers will prefer the convenience of gas, and refrain from the use of this oil, it will be very well with the country companies. But, to compare the present price of gas and kerosene, in most small towns, it is largely in favor of the latter. If the price of gas could be reduced to a considerably lower figure, there is no doubt but that it would run a successful competition with coal-oils, at however low a cost the latter might be sold.*

J. W. S., of N. J.—*The method of setting iron and clay retorts in the manner you describe, was first introduced by Mr. Croll, of London, England. By this arrangement the great intensity of the fire falls upon the clay retorts, which are much better able to stand the elevated temperature than those made of iron. The latter receive their heat from the return flues, and are therefore not subjected to that intensity which would otherwise cause them to soon burn out. This arrangement is adopted in several gas-works in London and other parts of England, but we are not aware of its being used to any extent in this country.*

O. W. D., of Ky.—*If the gas you tested did not exhibit the customary reactions with tumeric or reddened litmus paper, you may conclude that no ammonia was present.*

CORRESPONDENCE.

PETROLEUM AND WATER GAS.

White Plains, N. Y., 22d May, 1862.

To the Editor of the AMERICAN GAS-LIGHT JOURNAL:

I see by an extract in the JOURNAL, on page 343, taken from a Canadian paper, that the provincials are making a great stir over what they are pleased to call a new invention for making gas from water and petroleum. I should judge, by the article in question, that it is not very difficult for a native of that region to obtain a patent for anything. The alleged "inventors" in this case have swallowed, at one mouthful, both Sanders' patent and my own, in their claim to decompose water in a separate retort and pass it into the carbonizing retort to form a mixture at a red heat. They have copied my specification almost word for word. I do not wonder at their caution to parties using their patent without license, as light-fingered gentry generally fear that some others of their "profession" may plunder them, even at the expense of the old maxim about "honor among thieves," &c. This instance appears very much like another specimen of British fair play. It would seem natural, that had the "invention" been made in good faith, a patent would have been applied for in the United States; but, as it is, all this light is hid under a small provincial bushel.

I desire, at some future time, to ventilate some of the mistatements of Messrs. Thompson & Hind in regard to the working of what they are pleased to term their "invention;" but believing that the American public will not be so easily duped as these gentlemen evidently think the Canadians will, I will not now trespass farther upon your valuable space, and will conclude by saying, that they have done a discreditable act in appropriating what clearly belongs to others, and in endeavoring to claim originality for what is not even a new idea, but which has been known for some time, and further, has been practically worked in a number of places.

Respectfully yours,
W. H. GWYNNE,
Civil Engineer.

THE LONDON JOURNAL OF GAS-LIGHTING ON THE UNITED STATES GAS-TAX.

Pater familias finds fault with the proposal to tax gas; he says, "it cannot fail to be a serious check to the progress of gas-lighting in the North American States." He takes his youngest child, the AMERICAN GAS-LIGHT JOURNAL, to task for classing gas-light with luxuries, and says, "It has been, hitherto, customary to consider gas a necessary of life, and not a luxury. It is still so regarded in this country, and if it were proposed to tax gas, there would be an outcry against it from one end of the Kingdom to the other." He also says, "In the present debased condition of the American press, no remonstrance is raised against this imposition of a tax on light."

Pater familias is growing old and querulous, and with old age comes indolence, and we must make great allowance for his sayings, and his want of information on the subject of the American gas-tax. He has ceased to collect useful matter for his pages at home, and it is not to be expected that he can know much about affairs across the Atlantic. Do we not all know that *pater familias* has many "chips of the old block" to represent him, and to continue his labors—*Le Journal l'Eclairage au Gaz, Le Gaz, Journal für Gasbeleuchtung*, and the AMERICAN GAS-LIGHT JOURNAL, all youthful, sprightly, intelligent children; now that he has educated these, and established them, he thinks he may retire. And is he not right? does he not now do enough when he records in his pages parliamentary and legal intelligence, and leaves to his offspring, and especially his American child, the duty of keeping Gas and Water Companies informed of anything of interest of a scientific or mechanical character connected with their business?

To a superficial observer, it may appear that *pater familias* cares very little about this American child. We know he has said the child was "full of conceit and devoid of modesty," "and not particular about appropriating the knowledge of others." But this he said when suffering under a severe attack of the gout. These are not his real sentiments; he regards the American child with the tenderest solicitude, and watches all his efforts with a parent's eye. He cannot clearly understand how the American atmosphere has brightened the intellect of the child, and inspired him with a spirit of progression which he can appreciate but cannot imitate. See how kindly he reproves the child for making an improper use of the word luxury, and attempts to instruct him by the custom of old England.

Pater familias concludes that, as gas-light is a necessary of life it has ceased to be a luxury; yet, if he will refer to one authority truly English, Parliamentary History xxxiv., 134, 147, he will find that, in a debate in the Parliament of England, the window which admitted light and air was called a luxury. In opposition to a bill of Wm. Pitt in 1798, which proposed to treble the assessed taxes, except that the house and *window*-tax should be doubled, "it was urged by Sir Wm. Pulteney, and a considerable body of reputable members," * * "that the general and wise policy of the country, from the revolution downwards, had been to lay taxes on consumption, and consumption only; and to this there was no exception but the land-tax, which was of inconsiderable amount, for even the *window-tax* was a burthen on a *luxury* which might be diminished at pleasure."

Doubtless, the poor Englishman, after diminishing this tax at pleasure by building up the windows, and depriving himself of the light and air so necessary to his health and so delightful to his senses, felt and believed that a window was a luxury. After Englishmen have submitted to this odious window-tax, to enable their government to wage an aggressive war, how idle is the boast of *pater familias*, that an outcry would be raised from one end of the Kingdom to the other should a tax be proposed on gas! To maintain the integrity of the government, (for which the war in the United States is waged,) these Englishmen would submit to be taxed on everything on which a tax could be imposed.

Pater familias uses this language: "The scheme of taxation proposed by the Government at Wasington for meeting the costs of the war with the Southern States"——

In this language the old gentlemen displays great ignorance. I will say, for his information, that the Government at Washington is the government of the United States, which includes these Southern States, and the government is not at war with a foreign country called the Southern States, but is engaged in a war to resist a rebellion within its own boundaries—a rebellion, too, without any just cause, a rebellion which will be speedily quelled. All loyal citizens are willing to be taxed to pay the expenses of this war, to establish peace within the United States.

When the conspirators, who have instigated this rebellion, are put down, our citizens may say, with truth, that all the evils attending this internecine war have not been without some good. Our government will have passed through a severe trial and been proved. The war will have demonstrated to our own people, and to the people of the civilized world, the vast strength and resources of the United States. C.

Louisville, Ky., May 19, 1862.

THE GAS-WORKS OF LONDON.

BY ZERAH COLBURN.

(*From the London Engineer.*)

(Concluded from page 347.)

From the condenser, the gas is taken to the exhauster, except where, as already noted, the latter draws directly from the hydraulic main. Mr. Grafton, the original patentee of the clay retort, is said to have been the first to show that, by pumping the gas from the retorts, so as to relieve them from the accumulated resistance of all the water-joints which the gas encounters on its way thence to the gas-holder, the furring of the retorts with carbon was, in a great measure, prevented. This accumulated pressure often amounts to 33 in. of water, 28 in. being common, when we include the dip of the pipes through which the gas enters the hydraulic main. With exhausters, a partial vacuum is often maintained in the main, so that if a small opening be made, air will rush in instead of gas coming out. In the retorts, however, a very slight pressure, equal say, to 1 in. or 2 in. of water, is maintained, the difference between this plenum and the partial vacuum in the hydraulic main being accounted for by the resistance offered to the gas by the dip of the pipes, say 3in., into the tar in the main.

The first exhausters were reciprocating pumps, a sheet iron cylinder, open at the bottom, and having a flap valve opening upwards at the top, being made to work up and down, with its lower edge in water, around the rising end of a pipe, admitting the gas, and having also a valve, opening upwards, at its top, the whole apparatus being enclosed in a gas-tight case. Exhausters of this kind are still at work at the Pancras station of the Imperial Company's works. They were very much cheaper in first cost than Beale's exhausters now used; but the old plan finds few advocates now. The friction of the apparatus, although moving freely in water, was found to be considerable, and it imparted objectionable fluctuations to the gas, causing the water-gauge and the lights at the burners, to oscillate violently.

Mr. Beale, of Greenwich, produced a rotary steam-engine, many years ago, which, by way of bantering a distinguished opponent of that class of motors, he named the "Anti-John Scott Russell Steam Engine."

A considerable number of these engines are still at work, and there are many besides the patentee who have much faith in their ultimate triumph over reciprocating engines. One of small power drives all the machinery in Mr. Beale's own workshop, at a very trifling cost for repairs, the expenditure of fuel being no more than for any ordinary engine of equal power. At the South Metropolitan Gas-works, one of these engines is employed for driving the exhausters, and another for hoisting coal from the canal-boats coming up alongside. But Mr. Beale has found altogether the best market for his engines among the gas companies, who purchase them for exhausters. Every gas company in London, with the exception of the Equitable and the Great Central Consumers', uses them, the motive power, in the majority of cases, being a little upright trunk engine, of neat design, and fine workmanship, made by Mr. Beale, and fitted up on the same base-plate with the exhauster. At the South Metropolitan Gas-works, however, as already mentioned, one of Mr. Beale's rotary engines is employed to drive the exhausters, and at the several works of the Chartered and Phœnix Companies, and at the Commercial, Western, and perhaps some other works, they are driven by separate beam engines, generally by Scotch builders, the latter being a fact for which we cannot exactly account.

Mr. Beale's exhauster consists of a stationary cylindrical case, with a horizontal axis, within which revolves a shaft, placed eccentrically with respect to the axis of the case, and carrying two flat plates or pistons adjusted to fit accurately to the internal surface of the case. The principle is identical with that of the majority of rotatory engines and pumps. The tarry particles which, even after the gas has passed the condenser, follow it to the scrubbers, keep the wearing surfaces of the exhauster well lubricated.

The exhausters are generally placed by themselves in an apartment making considerable pretensions to elegance. In one respect, therefore, those who delight in strong contrasts, might derive much pleasure from a visit to some of the great gas-works of London—let us say the Pancras and Hackney-road stations of the Imperial Company, or the Commercial Gas-works at Stepney. From the smutty interior of the retort house, and from the ammoniacal stench of the out-door premises generally, to say nothing of the over-powering fumes from the sulphate of ammonia apparatus in works provided with that profitable adjunct, the visitor may retreat into an apartment fit for a nobleman's dining-room, well ventilated, and bearing evidence, on all sides, of an amount of taste and scrupulous neatness which, the commercial man would conclude, were strangely misapplied in a gas-works. We will not mention the works, but there are a number, and among them, some of the most profitable gas-making concerns in the metropolis, where, instead of being the glory of the establishment, the exhausting-room is its disgrace. But let us pass on, merely noting that the exhausters are generally worked with a partial vacuum, corresponding to 1 in. or 2 in. of water, below the atmosphere on one side, and against a pressure of from 24 in. to 30 in. on the other.

At most of the gas-works of the metropolis scrubbers are employed, a few, as the London, the Phœnix, and the City, having washers, the London, at Vauxhall, having no scrubbers, while the two others named, have both scrubbers and washers. In the scrubber, the last particle of tar is supposed to be taken up, and the means for arresting this impurity consist of a thick layer or a series of layers of coke, contained in a close vessel, and exposing a great aggregate surface to the gas. At the Phœnix Works, broken crockery ware is preferred to coke, as, after having become coated with tar, the former may be thoroughly cleansed by turning, when required, on a blast of steam for a few minutes, which melts and separates the tar, leaving the broken dinner-plates and old bottle glass to be used *ad infinitum*. In many works, the coke is constantly sprinkled with water, admitted through two or more tubular radial arms, revolving, by the reaction of the water, in the manner of the arms of a Barker's mill, the water being discharged through a number of small holes, as in the spargers used by the brewers for washing the extract out of the mashed grains of malt. At the Horseferry-road station of the Chartered Gas Company, the gas is subjected to three separate scrubbings, at different stages, in the whole process. Here, however, the scrubbers are lined with lead, and the liquid employed in them is diluted sulphuric acid, first admitted at a specific gravity of 1.030, and worked over and over the coke, until the density has risen to 1.210, when a fresh solution of acid is substituted. For one of the large scrubbers, somewhere about 300 gallons of dilute acid are employed at a time, a pump made throughout of lead, mixed with a little antimony, to give hardness to its substance, being used to pump up the acid from the bottom, and into a reservoir at the top, whence it falls again, streaming through a lead plate, perforated with a great number of small holes. The acid solution becomes in this way saturated with the ammonia present in the gas, and is then evaporated for sulphate of ammonia, a salt in request by alum and manure manufacturers, and bringing from £13 5s. to £13 10s. a ton, the commercial sulphuric acid employed in the process costing about £7 a ton. The ammoniacal liquor is treated also for the manufacture of the same salt. A similar apparatus is employed at the Crystal Palace District Works. At the London, and at the Surrey Consumers' Works, the ammoniacal liquor from the main is first boiled in an iron boiler, and what goes over is taken into a lead tank, where it is saturated with its equivalent of sulphuric acid, and evaporated by steam contained in lead pipes, which are made to traverse the tank close to the bottom. At most or all of the other works, the ammoniacal liquor is sold to the manufacturing chemists. At the City Gas-works, where both scrubbers and washers are used, the latter are supplied with a solution of hydro-chloride of manganese, to the strength of 32 on Twaddel's hydrometer, and after the solution has become saturated with ammonia, it is sold to the chemists, who evaporate it for sal-ammoniac (chloro-hydride of ammonia).

Those curious as to motors, may be interested to know that, at the City Gas-works, the agitators in the washers, are worked by an overshot water-wheel, for which the water is pumped up, at high tides, by a steam-engine. The washers require to be constantly in motion, and, were they driven by steam, an engineman would have to be always in attendance. As it is, the engine pumps up enough water in a few hours to supply the wheel for a whole day. The wheel is not far from 25 ft. in diameter, but exceedingly light, and the water is let on to the top buckets through three pipes, each perhaps 1 in. or 1¼ in. in diameter, and placed one in advance of another, so as to discharge into three buckets at the same time. The work to be done is very light, the agitators, once in motion, taking the liquid around with them, and which, indeed, only requires to be kept in motion to prevent the deposition of the hydro-chloride of manganese in solution.

Another curious mode of obtaining power was resorted to some years ago, at the Johnstone Gas-works, near Glasgow, a small fan being placed in the chimney, where it was worked by the strong draught, and thereby made effective as a motor for driving the exhausters.

The dimensions, already given, of the great gas-holders in London, afford a strong contrast with those of the vessels first set up for the storage of gas. From a valuable paper on gas-holders, read some years ago by Mr. Alfred Williams, before the Society of Engineers, it appears that the gas-holder or gasometer, constructed in 1803 by Mr. Murdock, at the Soho Works of Messrs. Boulton & Watt, was 8 ft. in diameter, and 6 ft. high. Not long afterwards, when some progress was being made in the introduction of gas for lighting towns, Sir Humphrey Davy, who, notwithstanding his great genius, was among the first to sneer at the most important applications of chemistry to the practical purposes of life, contemptuously asked Mr. Clegg if he intended to use the dome of St. Paul's for a gas-holder. The latter, in replying that he hoped to see the day when such vessels would not be much smaller than the great dome, could hardly have foreseen how gas-holders of even far greater bulk, would ultimately be required. The dome of St. Paul's is 145 ft. in external diameter, while already the Liverpool Gas-works are about to be enlarged by the construction of a gas-holder 240 ft. in diameter, 70 ft. high, and containing upwards of 3,100,000 cubic feet of gas. For some years, too, the Imperial Company have contemplated the erection of a holder 300 ft. in diameter.

For many years, gas-holders were regarded as dangerous, it being supposed either that gas was, by itself, explosive, or that it could become mixed in the holder with such a quantity of air as would render the combination explosive. It is now pretty well known that gas by itself, is no more explosive than pump-water, and it is evident that air cannot enter a vessel in which gas is compressed, while its elasticity is greater than that of air. If a hole were knocked through the side of a gas-holder, gas would escape, but as long as the pressure, generally equal to 5 in. of water, was maintained, no air could enter. But not long after the time (1813) when the Chartered Gas-works went into operation, a deputation, headed by Sir J. Banks, visited them to report upon the apparatus used, and, among other recommendations to Parliament, was one that the gas-holders should not be made of a capacity greater than 6,000 cubic feet, and that they should be enclosed in strong brick buildings. The walls which formerly enclosed one of the earlier holders, are still standing at the Horseferry-road station. Mr. Clegg was among the first, in the case of the Chester and the Birmingham Gas-works, to erect holders in the open air, and he did so in the face of much popular outcry, against the supposed danger of such a practice.

Preparatory to the construction of a gas-holder, it is necessary to provide a tank of sufficient size for its reception, and to make the tank thoroughly water-tight. The first tanks, for holders of small size, were generally made of wood, and were the work of the brewers' vat makers, who guaranteed their duration for a term of years. Wood was not applicable, however, beyond a certain moderate size of tank, and the tanks are now always made either of brick, stone, or iron. In one case, at Chester, Mr. Clegg excavated a tank in solid rock.

Gas-holders being now always made circular, on account of that form containing the most gas with the least amount of iron in the sides, the tank is a circular pit, 2 ft. or more larger, in its internal diameter, than the holder itself. The depth of the tank is about the same as that of the holder, where the latter is in a single lift. The telescopic arrangement, now generally adopted for large holders, permits of the use of a tank of only one-half or one-third the depth of the holder, according as two or three lifts may be used. It is not customary to excavate the pit to the full depth over the whole surface of the bottom, the full depth being requisite only next the wall forming the tank. A large conical mass of earth, carefully puddled over with clay, is generally left in the centre of the tank, except in very marshy soil. This cone or "core" is useful also in supporting the top of the holder when all the gas is out. In firm blue clay it is not always necessary to puddle the surface of the cone, but otherwise, from 18 in. to 2 ft. of good clay puddling is generally requisite. Occasionally, however, concrete and even brick-work is employed for facing the cone, while in some instances a hurdling or wattling of stakes and osiers is employed for the same purpose.

The tank wall must be of a strength dependent upon the nature of the ground, as well as upon the depth and diameter of the tank. At the Great Central Gas-works, the tanks, 105 ft. 9 in. internal diameter, and 26 ft. 6 in. deep, are 3½ bricks or 31½ in. thick at the bottom, exclusive of the spread of the footings, and fall off by three offsets of half a brick each, to 18 in. at the top. The new tank at the South Metropolitan works, about 112 ft. in diameter and 32 ft. deep, in ground full of water, is 4½ bricks, or 40½ in. thick at the bottom, the wall being successively taken in, half a brick at a time, until a thickness of 18 in. is reached at the top. Heavy counterforts are also employed around the walls of nearly all gas-holder tanks, these counterforts serving also to support the columns which retain the holder in place, and guide it up and down. In some of the best made tanks, three or four courses of brick-work above and below each set-off, are laid in cement, and hoop iron is applied as a bond at each set-off. The bricks, always of a hard durable quality, should be laid, as far as possible, in continuous courses, strong hydraulic mortar being generally employed, although cement is sometimes used at an additional cost. The impervious facing of the cone should generally be continued under the footing of the brick-work, and united to water-tight backing of some kind, as clay puddle,

around the outside of the wall. Stones, or other supports, should be built in at the bottom of the wall, to take the edge of the holder when down.

Mr. Alfred Williams, who has had much experience of gas-holder tanks, and gas-holders, recommends a trial of concrete blocks, in the construction of the former. Such blocks have been successfully used in river walls, as at Thames, Ditton, and Woolwich, and would cost hardly one-half as much as brick-work.

The tanks of two of the single lift holders at the Pancras station of the Imperial Company, are each 55 ft. deep. At the Hackney-road station, the tank of the great holder is 204 ft. in internal diameter, and 41 ft. 6 in. deep, the wall being carried up in cement for its whole height. Upwards of 2,000,000 bricks, and 5,000 cubic feet of stone were used in the construction of this tank. The site was that of a pond, and the clay was about 35 ft. below the surface. The whole cost of the gas-holder, including the tank, was upwards of £40,000, of which a large part must have been required for the tank alone. The large gas-holder at Kennington-oval, which cost not far from £15,000, has a tank about 162 ft. in diameter, and 36 ft. deep, the cost of which was, in round numbers, £6,000, the holder and columns costing about £9,000. Mr. Croll's estimate for the Great Central tanks, already described, was £2,351 each, there being four placed close together.

A considerable number of iron tanks are met with at the various gas-works of London. One at the City Gas-works, about 85 ft. in diameter, and 33 ft. deep, is annular, the inner ring being 75 ft. or 80 ft. in diameter, well filled in with concrete, and strongly hooped with wrought-iron bars. It depends upon the size of a tank whether it is cheaper to remove the whole body of earth to the bottom, paving the latter with iron plates, or to open out a circular trench only, and plate it on both sides. In the case of the tank at the City Gas-works, the latter course was adopted, the trench being opened out about 6 ft. wide all the way down, the sides being planked and shored as the excavation went on. Iron plates for gas-holder tanks are commonly cast in sizes of about 5 ft. by 3 ft., the lower tiers of plates being made of a thickness corresponding to the depth of the tank, say 1¼ in. for 30 ft., while the upper plates are about ⅝ in. thick. Each plate is stiffened by stout ribs on the back, and each tier of plates is bound together by a hoop or band of wrought-iron, those near the bottom of the tank being perhaps 5 in. by 1¼ in. The plates are cast with 3 in. flanges, caulked with iron cement. The latter substance is so much used about gas-works, that we may as well give here the usual proportions for its composition. To 16 parts (by weight) of clean cast-iron borings, are added 2 parts of sal-ammoniac, and one part of flour sulphur. These are mixed dry, and, when required for use, one part of the mixture is added to 20 parts of clean cast-iron borings, and worked up in a proper quantity of water. A little grindstone sludge mixed with the cement, improves it.

As for the construction of gas-holders, we can hardly do better than reproduce the particulars of the large holder at Kennington-oval, erected by the Horsley Iron Company, of Tipton, under the direction of Mr. Innes, engineer to the Phœnix Gas Company.

The lower lift is 160 ft. in diameter, and the upper lift 157 ft. 9 in., the "grip" of the lower lift being 9 in. wide, and 15 in. deep, and the cup at the bottom of the upper holder also 9 in. wide, and 15 in. deep. The holder is guided upon sixteen columns, each formed of boiler iron, and each 73 ft. high, from stone base to cap. These columns are about 32 ft. 8 in. apart from centre to centre, the diameter, or distance between the centres of two opposite columns, as measured across the tank, being 166 ft. 9 in. The distance across the tank, from face to face of guide iron, is 161 ft. 4 in.

The columns are 3 ft. 3 in. in diameter at the base, 3 ft. 2 in. at the middle of their height, and 2 ft. 8 in. at top. They are formed of tiers of plates averaging about 6 ft. high, and having three plates in the circumference of each tier. The lower two tiers or rings of plates, are of ⅝ in. iron, all the other being ½ in. At the bottom of each column, is an angle iron ring, 4 in. by 3 in. by ¾ in., this ring being rivetted to the column, and held to the cast-iron base below, by sixteen bolts, ¾ in. in diameter. Each column (the cast-iron base of the column) is tied down by four bolts, there being in all 64 tie-down bolts, each 16 ft. long, and 2½ in. in diameter. Where they pass through the tie-down plate, which is built into the brick-work of the tank, the bolts are made square for a few inches. Cottars 3 in. by ¾ in. go through the lower ends of the bolts, under the tie-down plate. The base castings forming the bottom of the columns, are 9 in. high, 5 ft. 6 in. by 4 ft. 9 in. square on the sole, and of a good thickness of iron. Outside of these, are castings of ½ in metal, forming a plinth and moulding, the whole averaging 2 ft. 6 in. high. A Doric capital in ½ in. metal, is fitted also to the top of each column. The tops of the columns are tied together by two rods, each 2 in. in diameter, and at the middle of their height, they are tied together by two rods, each 1½ in. in diameter, 992 lineal feat of each diameter of tie-rod being employed for tieing the columns together. The usual practice, as our readers will be aware, is to employ cast-iron columns, with heavy cast-iron girders between them. For the latter, there is really no occasion whatever, all the support afforded by girders being equally obtainable by means of tie-rods.

On the inner face of each column, and descending, also, to the bottom of the tank, is a T-shaped guide of cast iron, each guide being 109 ft. high, from the bottom of the tank, to the top of the column. These guides are 6 in. wide on the face, the rib projecting 6 in. also, and are cast 1¼ in. thick, throughout.

Around the lower edge of the lower lift, is a cast-iron curb, made in two portions. The one is a cast angle iron, 7 in. by 6 in., and of ⅞ in. metal. This being cast to the right curve, is applied on the inner side of the holder, the 7 in. side being upright, and the 6 in. side projecting horizontally outwards. A corresponding cast channel-iron, 6½ in. high, 4 in. wide, and ¾ in. metal, is then applied to the outside of the holder. The respective portions being cast in segments about 12 ft. long, are put on so as to break joint with each other, and are bolted together through the holder, and also by their bottom flanges, ⅝ in. bolts being used.

The grip is made with 3 in. by 2½ in. angle iron, in 18 ft. lengths, with lapping pieces of the same section, and 3 ft. long at the joints. The top of the grip is made of ⅝ in. plates, cut in segments of the greatest length of which the iron would admit, and 7 in. wide all round. These segments are put together with butt plates, on the joints, each 6 in. long. The dipping portion of the grip is made of ¼ in. plate, edged on both sides at the bottom with 2 in. by ¼ in. half round iron.

The top tier of plates next the grip, and the bottom tier next the curb of the lower holder, are ¼ in. thick and 2 ft. 6 in. wide. The next contiguous tiers, one above and one below, are of ⅛ in. iron, and about 2 ft. wide. The next contiguous tiers are of No. 12 gauge, all the others being of No. 14 gauge. On the inside of the lower lift, and at positions corresponding to the columns outside, vertical stiffening plates, 2 ft. wide and 3-16 in. thick, are put in for the whole height. The sides of the lift are stiffened by forty-eight vertical Memel timbers, 6 in. by 3 in. in section. These are arranged as follows:—Sixteen pairs 4 feet apart are placed on the inside of the lift, one pair opposite each column, and the rest of the timbers or stays, are arranged so as to come in intermediate, between each pair. These timbers are securely bolted to the grip at the top, and to the curb at the bottom, and also with two ⅝ in. bolts to each tier of plates in the sides of lift.

The lower lift is guided by sixteen 5 in. cast-iron rollers, 6 in. wide, attached by plate iron brackets to the bottom curb, and by the same number of 12 in. rolls at the top, each 6 in. wide on the face, and having a flange 3 in. deep on one side.

The upper lift of the holder has a top curb made with angle iron, 6 in. by 3½ in. by ⅝ in., with lapping pieces 3 ft. long at the joints, and connected to a ring of ⅝ in. plate iron, 21 in. wide, forming a portion of the top of the holder. The sides of the upper lift are ¼ in. thick next to the curb and the cup, the next contiguous tiers of plates being $\frac{3}{16}$ in. thick, and all the others of No. 12 gauge. The cup is made precisely the same as the grip of the lower holder, the same sections of iron being used throughout. The sides of the upper lift are stiffened by thirty-two Memel timbers, sixteen being placed so as to come opposite the columns outside, and the rest intermediate, between them. The timbers opposite the columns, are 12 in. by 3 in. in section, and are each fastened by a pair of angle irons, 4 in. by 3 in. by ½ in. The intermediate stiffening timbers are 9 in. by 3 in. Gusset stays of 3 in. by 3 in. by ½ in. angle iron, extend also from the angle irons, holding the 12 in. by 3 in. timbers, diagonally, inwards and upwards, to the inner edge of the curb plate, in the top of the holder.

The top of the holder next to the ⅝ in. curb plate, is ¼ in thick, the next interior ring of plates being ⅛ in., the next No. 10 gauge, and all the others in the centre, of No. 12 iron. The top was laid out to be perfectly flat, but the slight stretching of the plates, occasioned by riveting over a surface of nearly half an acre in extent, drew the iron up in the centre, to a height of 4ft. or 5 ft., the present form of the top being that of a segment of an immense sphere.

A man-hole 5 ft. in diameter in the clear, and 6 in. high, is made in the top of the holder. The rim is made of ¼ in. plates, with 2½ in. by ⅝ in. angle iron, and the top also of ¼ in. plate, held down by ½ in. bolts, placed 3 in. from centre to centre, the joint being made with a hemp gasket and red lead.

The upper lift is guided within the lower lift by small rollers, attached to the lower outer edge of the cup, and by sixteen wheels 3 ft. in diameter, mounted on large standards, on the top of the curb.

All the joints of the plates were caulked with two strands of whip-cord, laid in on opposite sides of the rivets. All the plates and wrought-iron work were thoroughly coated with raw linseed oil, the joints being furthermore coated with a mixture of red lead and oil. The whole of the holder, both inside and out, was afterwards painted with two coats of red lead, mixed in equal quantities of boiled and raw linseed oil, and the work afterwards proved with compressed air.

Holders with flat tops have been adopted in several cases of late, but it has been more customary to form the roof to a portion of a sphere, and to truss it with struts and tie-rods. The roof of the great holder near the Hackney-road, is stiffened in this way. Even when the holder contains more or less gas, so that the roof is supported clear of the ground below, the pressure of the gas, equal to from 200 to 250 tons under the roof of a large holder, would seem to require some amount of strengthening in the roof. When down, a flat roof can rest on a timber framing so as to avoid sagging, while, with a trussed roof, with a boss in the centre, the support is generally upon the cone of earth left in the tank, a stone coping or iron plate being put in, to take the bearing.

The earlier gas-holders, of small dimensions, required to be counter-weighted, but with the large holders now made, no counter-weights are necessary. On the contrary, iron has to be added to obtain the proper pressure of the holder upon the gas. The general weight or pressure of the large London gas-holders, is equal to 5 in. of water over the whole surface. The Phœnix Company's holder, which we have described, weighs 250 tons 18 cwt., of which 207 tons 13 cwt. are wrought, and 43 tons 5 cwt. are cast-iron. The total weight of holder and columns, guides, and all iron work, is 429 tons 18 cwt., of which 291 tons 19 cwt. is wrought, and 137 tons 19 cwt. cast-iron. The great holder near the Hackney-road, is said to "throw" at a pressure equal to 8½ in. of water, when filled. The total iron work in this holder, is about 1,500 tons, there being a peristyle of Doric and Corinthian columns, rising from twenty-four pedestals, each weighing 5 tons, and cast in a single piece.

An excellent holder, 105 ft. in diameter, and rising, by two lifts, to a height of 50 ft., was erected last year at the Western Gas-works, under the direction of the Company's engineer, Mr. Pritchard. The upper curb of the top lift is made of ¼ in. and ⅝ in. plate iron, so as to form, with the sides and top, of the holder, an annular box 18 in. deep, and 2 ft. wide all around. No truss is used in the roof. The joints throughout the holder were put together on painted tape. The whole cost of the holder and tank, was under £12,000, including all connections. It is, we are told, more difficult to secure tightness in a holder intended for cannel gas, than for ordinary gas; but Mr. Pritchard's holder, which contains only cannel gas, has remained perfectly tight.

Almost all large gas-holders are now made in two

lifts, upon the telescopic plan. This plan greatly diminishes the cost of the tank, which need be hardly more than half as deep as would be necessary, if the whole depth of the holder were in a single lift. On the other hand, the cup of a double lift holder is more or less liable to leak, and especially liable to freeze up in winter.

In the valuable paper already referred to as read by Mr. Williams to the Society of Engineers, he gave the sizes and cost of a number of gas-holders, as follows:

The two holders erected in 1853 at the Commercial Gas-works, have brick tanks, and have each two lifts, the outer or lower lift being 122 ft. in diameter, and 24 ft. 6 in. high, while the upper lift is 119 ft. 4 in. in diameter, and 26 ft. high. The capacity of each is 580,000 cubic feet, the pressure equal to 3½ in. of water. The cost of the two holders was £17,056 14s. 8d., equal to £8,528 each. These holders have flat crowns without trussing. Two other holders erected at the same works, the one in 1850, and the other in 1852, were each 102 ft. in diameter on the lower, and 100 ft. on the upper lift, each lift being 26 ft. high. The capacity of each is 416 000 cubic feet, and the pressure 5 in. of water. One of these holders cost, including brick tank, £4,900, and the other £5,350. A single lift holder with brick tank, belonging to the Imperial Company, is 157 ft. in diameter, and 40 ft. high, holds 730,000 cubic feet of gas under 5 in. pressure, and cost £11,400. It was put up in 1853. A telescopic holder belonging to the Phœnix Company, 150 ft. in diameter, 37 ft. high, and holding 630,000 ft., cost £12,500, of which the brick tank cost £4,000. This was erected in 1847. The holder of the Crystal Palace District Gas-works, at Sydenham, is telescopic, and works in a brick tank. The lower lift is 62 ft. 6 in. in diameter, and 18 ft. 6 in. deep. The upper lift is 60 ft. in diameter, and 20 ft. high. The capacity is 113,300 cubic feet, and the pressure 7½ in. The cost, erected in 1854, was £3,230.

From the gas-holders, the gas passes through the governors to the mains. The governor is made like a small gas-holder, but to the movable part is attached a conical valve in the inlet pipe. Thus, as the pressure increases, and the small holder of the governor rises, the conical valve shuts off a portion of the incoming gas.

The mains, which are laid 2 ft. or 3 ft. below the surface of the ground, are always made with socket joints, caulked with yarn, with about 2 in. of lead over it. A 36 in. main is about ⅝ in. thick, except at the socket, where the thickness may be 1¼ in. or 1½ in. thich, to give strength to withstand caulking. A 24 in. main is hardly more than ½ in. thick. The smaller mains are not far from ⅜ in. thick.

It would be interesting here to enter upon the question of the flow of gas through mains, but our space does not permit.

The condition of the London gas companies in 1859, and the four preceding years, was made public in 1860 through the labors of a select committee on the supply of gas to the metropolis. From the particulars then elicited we have prepared the following:

Name of Company.	Capital 1859.	Cap'l paid up 1859.	Debenture debt.	Dividend per cent. 1859.
Chartered	£900,000	£660,000	nil.	8
City of London	300,000	300,000	"	6
Commercial	320,000	273,210	14 600	6
Equitable	200,000	200,000	69,750	6
Great Central	200,000	172,160	66,000	5
Imperial	1,300,000	934.705	149,000	9
Independent	120,000	120.000	30,000	5
Ratcliff	100,000	100,000	nil.	5
Western	300,000	205,000	39,000	7
London	556,789	550,228	82,280	4.6
Phœnix	540,000	468,000	nil.	8
Surrey Consumers'	150.000	132,538	34,500	8
South Metropolitan	200,000	152,000	nil.	9
Totals	£5,186,789	4,267,841	485,130	

Since 1859, the profits of the London gas companies have increased, and some of those then dividing 5 or 6 per cent. are now paying 10 per cent. The coal carbonised by the Chartered Company, at their three stations, in 1859, was 116,554 tons.

PATENTS.

UNITED STATES

35,059.—J. W. Douglas (assignor to W. and B. Douglas), of Middletown, Conn., for Improvement in Pumps:

I claim the combination of a vertical pump cylinder, the valve chest in position, as described, and the lower end of the cylinder being made imperforate, substantially in the manner and for the purpose set forth.

I also claim the use of a tinned iron plate, P P, to aid in forming the floor of the horizontal passage, O2 O2, extending from the front to the rear of the valve chest, substantially in the manner and for the purpose described.

35,061.—W. H. Matthews, of Chelsea, Mass., assignor to Union Glass Co., of Somerville, Mass., for Improvement in Glass Deflectors for Lamps:

I claim the described mode of constructing the glass deflector holder, viz., of the separate cap and base rings provided with means of connecting them as set forth, in order that they may be applied to the glass deflector and its flanch, as specified.

35,065.—John Schatt (assignor to himself and S. P. Mervine), of Philadelphia, Pa., for Improvement in Dry Gas Meters:

I claim the employment, in dry gas meters, of levers, C C', provided each with a slot, e, in its one end, for the reception of a traversing pin, f, the same operating together substantially in the manner set forth and for the purpose specified.

I also claim making the knuckle, D, to have only a single central arm, d3, as set forth, and connecting it with the valve rod levers, provided with suitable slots in their connecting end, substantially in the manner described and set forth, for the purpose specified.

35,077.—James Budd, of Sandy Hill, N. Y., for Improvement in Pumps:

I claim, first, The two induction pipes, F' Q, in combination with the chamber, G', provided with the valves, G S, and all arranged substantially as and for the purpose set forth.

Second, The combination and arrangement of the two nozzles, M M', chamber, L, and valve, N, and eduction pipe, K, substantially as and for the purpose set forth.

35,079.—Lysander Button and Robert Blake, of Waterford, N. Y., for Improvement in Pumps:

We claim the two pistons operating in one cylinder, by means of the two piston rods, one passing through the other combined with, and operated by, the double crank, in the manner and for the purpose set forth.

35,094.—A. J. Gove, of San Francisco, Cal., for Improvement in Faucets:

I claim the combination of the hollow-truncated cones, A and B, and nozzle D, the whole being constructed, arranged, and operated, in the manner substantially as specified, and for the purpose set forth.

35,104.—Enoch Osgood, of Boston, Mass., for Improved Regulator Valve for Air, Gas, &c.:

I claim the combination of a valve, and a diaphragm enough larger than the valve, to give it any desired power over it, wanted to close it, to hold and balance any pressure that may come in between them to be weighed out by weights on the diaphragm, to give the desired pressure wanted in the chamber below the valve for use, constructed and connected together, to operate against each other, substantially as and for the purpose described.

35,108.—H. H. Palmer, of Rockford, Ill., for Improvement in Pumps:

I claim the combination of the water chamber, H, with the suspension rod, K, when arranged and operating as described, for the purpose set forth.

I also claim suspending the water chamber from the platform, A, by means of the rods, J and K, and guide ring, I, as and for the purpose described.

I also claim the combination of the flanged standard, B, air vessel, C, piston tube, E, piston, G, and water chamber, H, when the whole are arranged for joint operation, substantially in the manner described.

35,113.—Isaac Sherwood, of Unadilla, N. Y., for Improvement in Water Elevators:

I claim, first, A water elevator, having, in combination, the wheels, D and D2 and E, constructed and operating substantially as described.

Second, In combination therewith, the double-acting lever, G, and G2 H K K2, constructed and operating substantially as described.

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PATENT-OFFICE NOTICES.

United States Patent-Office,
Washington, April 17, 1862.

ON THE PETITION OF PHEBE Ann Fisk, Executrix, &c., of Almond D. Fisk, late of the City, County, and State of New York, praying for the extension of a Patent granted to the late Almond D. Fisk, Nov. 14, 1848, and re-issued March 6, 1860, for an improvement in Coffins, for seven years from the expiration of said Patent, which takes place on the 14th day of November, 1862.

It is ordered that the said petition be heard at the Patent-Office on Monday, the 27th of October next, at 12 o'clock m.; and all persons are notified to appear and show cause, if any they have, why said petition ought not to be granted.

Persons opposing the extension are required to file in the Patent-Office their objections specially set forth in writing at least twenty days before the day of hearing; all testimony filed by either party to be used at the said hearing must be taken and transmitted in accordance with the rules of the office, which will be furnished on application.

The testimony in the case will be closed on the 18th of October next; depositons and other papers relied upon as testimony, must be filed in the office on or before the morning of that day; the arguments, if any, within ten days thereafter.

Ordered, also, that this notice be published in the "National Republican," Washington, D. C., and "Tribune," New York, N. Y., once a week for three successive weeks; the first of said publications to be at least sixty days previous to the day of hearing.

D. P. HOLLOWAY,
Commissioner of Patents.

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The Commissioner of Patents *having confirmed the decision of the Examiners-in-Chief*, and, on final hearing, awarded a patent to Wm. Combe for his invention of solid conically slotted trays for gas-purifiers, and rejected R. G. Hunt's claim thereto; all persons are warned against purchasing said conically slotted solid trays without license from N. O. Hawxhurst, the assignee of said Combe, as they will otherwise be liable for damages therefor.

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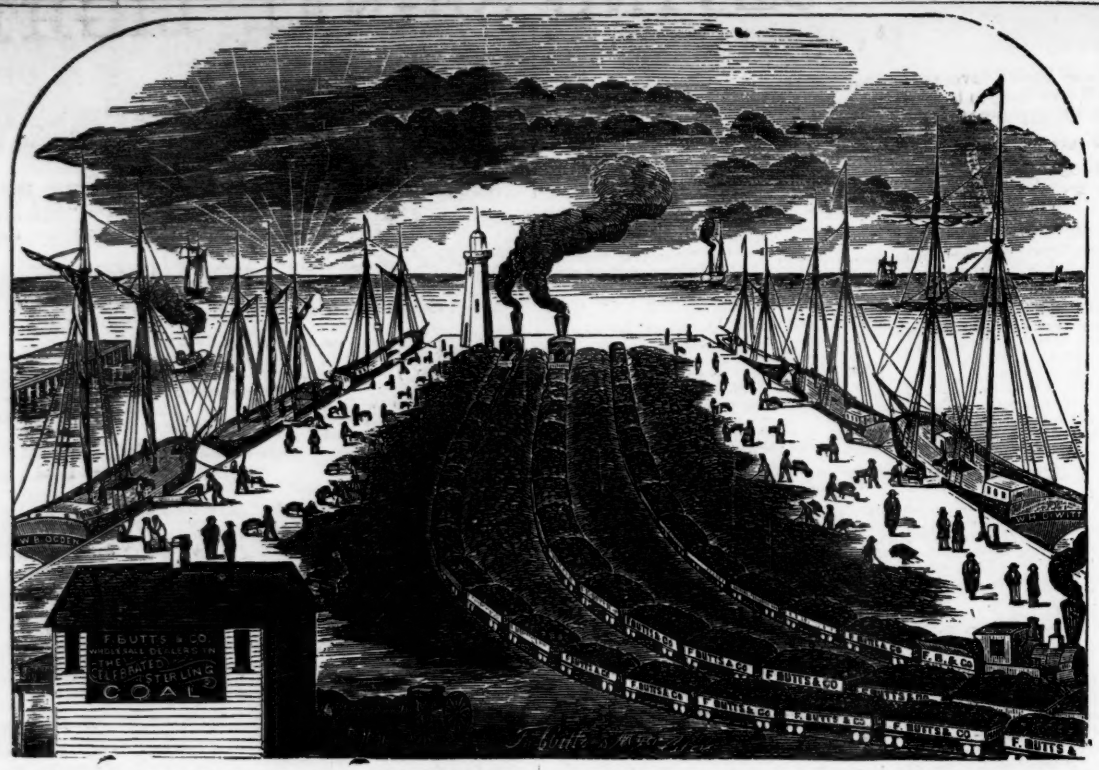

(View of F. Butts & Co.'s Coal Pier, Cleveland, O., on the Government and Cleveland & Pittsburgh R.R. Piers at the mouth of the Cuyahoga River, Lake Erie.)

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From the MANHATTAN GAS LIGHT CO., New York.

Gentlemen:—Yours of the 9th inst. is received. The "Sterling Coal" received from you during the past year worked very satisfactorily—averaging 9,520 cubic feet of 15 candle Gas per ton of 2,240 lbs., and 41 bushels of Coke weighing 1,465 lbs.

We consider it among the best of American Gas Coals, for the quantity and quality of the Gas produced, and also for the excellent quality of its Coke.

I am Gentlemen, Your Obedient Servant, CHARLES ROOME, President.

From the OGDENSBURGH GAS CO., Ogdensburgh, N. Y.

January 6, 1862.

Messrs. F. Butts & Co.—This Company has used your Sterling Coal since July, 1860. We consider it the best Coal we have ever used; gives us larger yields of Gas, requires less lime, and makes a superior Coke. Respectfully, Yours, R. E. GORDON, Sup't Og. Gas Works.

From the RONDOUT AND KINGSTON GAS LIGHT CO., Rondout, N. Y.

January 10, 1860.

Messrs. F. Butts & Co.—Gentlemen:—This Company have used your Coal nearly two years. It is in every respect satisfactory, and to it is given the preference over all other coals. Its average yield is 4 40.100. The light clear and strong. The Gas is easily purified and quite free from sulphur. The yield of Coke is large and of superior quality. It is, in my opinion, equal to any Gas Coal in the market. Very Respectfully, WM. W. HAGUE, Sup't.

From the SANDUSKY GAS CO., Sandusky, O.

January 6, 1862.

Messrs. F. Butts & Co., Cleveland.—Gentlemen:—We have used your Sterling Coal for two years and six months past, and find it superior in quality and all that a number one Gas Coal can be. The illuminating power of the Gas is high, the Coke is of a superior quality, and in many instances our monthly average product has been 4 40.100 per one lb. Coal. It gives us entire satisfaction. I am, Gentlemen, Yours, Respectfully, WILLIAM HUDSON, Sup't and Sec'y.

From the TOLEDO GAS LIGHT CO., Toledo, O.

Gents:—Your favor of the 28th inst. to hand and noted.

The Sterling Coal received from Messrs. Butts & Co., the last summer and fall, fully sustains the character it has as a Gas Coal, from previous use in our works. We think the quality of Gas is very good, a little better than that produced from the Coal had of them the year previous—yielding 8,666 feet per ton of 2,000 lbs., and 36 bushels of Coke of very good quality, well adapted to our use.

Respectfully, Yours, GEO. SPENCER, President.

From the BUFFALO GAS LIGHT CO., Buffalo, N. Y.

Messrs. F. Butts & Co.—The Sterling Coal we have had from you we find to be an excellent Gas Coal. The yield of both Gas and Coke is good. The illuminating power of the Gas is high and the quality of the Coke is very good. ROBERT ROBSON, Foreman Gas Works.

From the CLEVELAND GAS LIGHT & COKE CO., Cleveland, O.

Gentlemen:—This Company has used between 3,000 and 4,000 tons of your "Sterling Coal," and are still using it with very satisfactory results. We find the average product of a ton of 2,000 lbs. is about 8,800 feet of Gas, and about 37 bushels of Coke. The Gas is of good illuminating power and quite free from sulphur or other impurities, one bushel of lime purifying 9,000 feet, and the Coke of vesy superior quality.

The yield of Gas is about the same as from the Pittsburgh Coal, and the Coke is better adapted to our use. Yours, Truly.

T. DWIGHT EELLS, Secretary.

From the ALBANY GAS LIGHT CO. Albany, N. Y.

Messrs. F. Butts & Co.—Gentlemen:—We have been using your "Sterling Coal" at these works for two years, finding it all that is important in Gas-making Coal, as respect yield and quality of Gas, and freedom from sulphur—as much so as any of the Coaking Coal in use. We are disposed to contract for a frrther supply of the same quality.

Very Respectfully, PAUL A. SABBATON, Sup't.

From the TROY GAS LIGHT CO., Troy, N. Y.

Messrs. F. Butts & Co.—Gentlemen:—The Coal we have used for the past year at our works has been mostly "Sterling." It has given us full satisfaction in every respect.

S. S. DAUCHY, Sup't.

The following analysis of "Sterling Coal" was made by Prof. J. Lang Cassels, Professor in the Cleveland Medical College, who stands at the head of his profession as a chemist, and any statement made by him can be relied upon with safety.

Sp. gr.	1,288
Eygremaeric Moisture	1.85
Volative Combustible Matters	34.15
Coke (clear and porous)	64.00
	100
Fixed Carbon in the Coke	62.00
Ashes (yellowish white)	2.00
	64.00

COMPOSITION OF ASHES.

Silex	0.80
Alumini	0.45
Sulphate of Iron	0.75
	2.00
Per centage of Sulphur	0.23

J. LANG CASSELS, M. D.,
Prof. of Chemistry, Clev. Med. Col.

P. S.—The specimen from which the above analysis was made was taken by myself from a car load, and may be regarded as a fair average; in fact, this coal is very uniform in its characteristics. It also yielded 4 per cent. more gas than the Pittsburgh Coal. J. L. C.

We would also refer to Gas Companies in the following places:

New York City (Manhattan and New York Co.'s), Brooklyn, Albany, Troy, West Troy, Rochester, Oswego, Ogdensburgh, Lansingburgh, Newburgh, Rome, Palmyra, Geneva, Yonkers, Rondout, Kingston, Albion, Brockport, Seneca Falls, Elmira and Lyons, in State of New York; Cleveland, Toledo, Sandusky, Norwalk, Oberlin, Salem and Fremont, in Ohio; Detroit, Ann Arbor, Grand Rapids, Kalamazoo, Jackson and Adrian, in Michigan; Coburg, in Canada; Chicago, Ill., and two Companies in Milwaukee, Wisconsin.

STERLING COAL MINES, situated in Pennsylvania, are wholly under our control; the coal mined and sold only by us or our agents. (Agents in every instance having authority over our signature.)

Five years experience in Mining, Sale and use of Sterling Coal, gives us full confidence in asserting there is no Coal that combines all the requisites so largely for a Gas or Smithing Coal as this.

This year we are several hundred yards further in the Mine than last season, and feel assured Sterling Coal will more than sustain the high reputation it has heretofore gained.

Our facilities largely increased for Mining and Shipping, we are prepared to supply the great demand for this Coal on a much more extensive scale.

Not being dependent upon high water for transportation, but receiving our Coal by RAIL, we are at all times prepared to fill orders, and ready to contract for delivery of the Celebrated Sterling Coal, on board Vessel or Cars at Cleveland, or at works of Gas Light Co's, in any of the Northern States or Canada.

Cleveland, *January* 15, 1862. Address— F. BUTTS & CO., Drawer 74, Cleveland, O.

POTTS' REVOLVING SIGNAL LIGHTS,

PATENTED SEPTEMBER 8, 1857.

Mr. ALBERT POTTS, the well known Inventor of the LAMP-POST LETTER-BOXES, which have been adopted by the Post-Office Department for the large cities of the United States—and also of the GAS METER BOX, to be set in the front walls of houses, thus doing away with visits from Gas Inspectors, or burglars in gas-clothing, has lately brought forward a third Invention, which in point of importance and world-wide usefulness, surpasses the others entirely.

These SIGNAL LIGHTS are intended for use on Vessels propelled by Steam, and those exclusively. They specially indicate the presence of a Steamer, and by their use, there will be less likelihood of mistakes, and consequent collision than at present. They are also intended for SIGNALLING AT NIGHT, and can be used for that purpose UNDER ANY CODE of SIGNALS NOW ARRANGED FOR FLAGS.

This Improvement in Lights for Steam Vessels, consists in having the Lanterns containing the colored lights, connected by means of a series of cogged gearing with some convenient part of the Engine or Machinery, so as to cause them to have a revolving motion around their axis. On side wheel steamers, the Lanterns should be placed directly over the wheel-houses, and the power, or motion to turn them, may then be very conveniently obtained from the paddle-wheel shaft. On Propellers, the Lanterns should be placed on each side of the Pilot House, or hurricane deck, and the rotary motion derived from any convenient or suitable part of the Engine or Propeller Shaft. Each Lantern is supported on the end of movable cranes, so that their relative positions may be changed and properly adjusted to suit the view of observers on either side of the vessel at the time of signalling.

The Lanterns to be used in this improvement may be constructed for Burning Oils, Fluids, Gas, or any of the known modes of illumination, and should be furnished with one or more lenses and reflectors, so as to concentrate the rays of light, and project them over the horizon with the greatest intensity. The lenses for this purpose should be made with colored glass, viz., Red and Green, and the position of the respective Lanterns, according to the color of the lenses therein, must be placed on the sides of the vessel so as to answer to the requirements of Rules and Regulations made and published by the Supervising Inspectors of Steamboats, agreeably to the Act of Congress of the United States in such cases made and provided. That is to say—by said Regulation—the Lantern having the green lenses for producing the Green Colored Light, must be placed on the starboard side of the vessel, and the other Lantern producing the Red Light, to be placed on the port side thereof In pursuance, also, of the aforesaid Rules and Regulations, there is to be found in board and behind each Lantern, a screen to answer the purposes therein mentioned.

The cogged gearing, by which the Lanterns are connected with the Engine or paddle wheel shaft, and thereby caused to revolve when the Engine is in motion, is so arranged that the connection may be readily shipped or unshipped, and the lanterns made stationary or otherwise, at the pleasure of the Pilot, or those whose duty it may be to operate and attend to the same. The cranes on which the Lanterns are placed, are also rigged so as to be readily turned horizontally from one position to another, so as to present one or both lights to the view of observers when laying athwart ships at the time of signalling.

On the Use and Application of the Improvement for Night Signals.

When the vessel is under weigh, or going ahead in its course, the Lanterns are to be placed directly athwart ships; so that such colored light therein will then have the position and place prescribed by Rule Seventh of the aforesaid Supervising Inspectors of Steam Boats, and with the screens behind them, as above described, will then answer all the intents and purposes for which the colored lights are thus required to be used, as illustrated in the several diagrams published by said Inspectors for the working of a system of Colored Lights. The Lights in this case, according to the color seen by the observer, indicate the course or direction of the vessel whereon they are carried. When the Lanterns with the colored lights therein, are made to revolve around on their axis, as proposed in this improvement, in addition to the signal above, another, and as we believe, very important and useful signal is thus formed, indicating that the vessel, whereon it is carried is a Steamer. In dark foggy nights, it is found by experience, to be somewhat of a difficult task to distinguish sailing vessels from Steamers and Propellers, especially when the latter are rigged, and carry a press of sail. When Steamers meet "head and head," it is the duty of each to pass to the right, or, on the larboard side of the other. Whereas, when a Steamer meets a sailing vessel, the former must give way and allow the latter to pursue its course. Hence, to carry out the regulations of the said Steamboat Inspectors, and prevent collisions, it is important to have some infallible sign, whereby the character of the vessel may be readily seen and determined. Several very fatal collisions have recently taken place through mistakes of this kind.

On Signals for Speed and Distance.

The gearing of the Lanterns with the paddle wheel or propeller shaft, may be so arranged as to be an index of their speed A very good proportion, would probably be to make the Laterns turn about one third as fast as said shaft. Hence, when the speed of the vessel is previously known, when making a certain number of revolutions of the paddle or propeller, it becomes an easy task from observing the time with which the Lanterns thereon may be turning to approximate to the speed with which the said vessel is moving at the time of observation. Again, as the arcs described by the rays of light from each lantern, as they revolve around on their axis, is greater in proportion to the distance from said lantern, so will the time in which said rays move over any given space, be less in the same proportion. Hence, when the lights are very remote, or far off, from the observer, the duration of each column or cylinder, of rays from each lense, would pass the eye of the observer, in a short space of time, or with great velocity. Whereas, at a nearer point of observation, the time of its passage would be considerably lengthened, or the motion thereof apparently much slower. From these facts, we believe the improvement is susceptible of indicating, in an approximate manner, the speed and distance of vessels whereon the revolving lights may be used.

On the Application of the Improvement for Marine Telegraphic Purposes.

The Revolving Lights can be readily applied to the general purposes of Marine Signalling at night, as follows: In order to show this application, we have adopted the Numbers as given in Roger's Code of Marine Day Signals, believing that work to be somewhat of a standard in matters of this kind. Instead of the flags used in the above code, for day signals, to indicate the combinations of two or more letters of the Alphabet, which combination is referable to certain numbers indicative of the words or sentences telegraphed, we propose to perform the same operation, at night, by means of the two revolving colored lights, so as to indicate the numbers directly to which the intended words or sentences to be telegraphed are referable. Thus, whether the vessel to be signalled is ahead, astern, or abaft the beam, the position of the two colored lights must be so adjusted, by means of the moveable cranes, whereon said lanterns or lights are fixed, that the two lights may be fully made visible to the observer. When both lights are thrown into this position, stopping the motion of the lanterns may be the signal for calling attention, or a rocket fired off, or the steam whistle blown, would answer the same purpose. Now, in order to represent the ten numerals, we propose to indicate them by the respective motions of the two colored lights, as follows:

RED LIGHT.				GREEN LIGHT.			
One Red, Represents Number			1.	Two Green, Represents Number			2.
Three	do.	do.	3.	Four	do.	do.	4.
Five	do.	do.	5.	Six	do.	do.	6.
Seven	do.	do.	7.	Eight	do.	do.	8.
Nine	do.	do.	9.	One	do.	do.	0.

In the above arrangement, it will be seen that all the odd numbers are made by the Red Light, and the even numbers by the Green Light. In order to indicate the repeat of the last number, once or more times, or for other special purposes, which may hereafter be found useful and necessary, an even number of lights may be shown by the Red, and an odd number by the Green. It will be understood that when the Lanterns are made with three lenses in them, the numerals as above arranged are formed by the number of times a new light or lense is presented to the observer. Thus to indicate the number 3, the Red Light or Lantern would make one entire revolution; and to make the number 6, the Lantern carrying the Green Light would make two revolutions, and so on with the other numbers. When a symbol is made, the motion of the Lantern is to be suspended for a short time, and when a number expressing a sentence is formed, the lantern may be stopped for a longer period, or some one of the special signals above referred to, may be used for this purpose.

To show the application of this improvement as above mentioned, whereby these Lights can be used as readily for Night Signals, as Flags are used for Day Signals by the author of Roger's Code, we shall use the sign O colored red or green, according to the light used, to show the number of movements performed by the respective lights in order to represent any desired number of said code, suitable for the required purpose.

RED LIGHT.	GREEN LIGHT.
O, O, O, O, O,	
O, O, O, O, O, O, O.	
	O, O.
	O. O.

The above would represent the number 5722, and by reference to said Roger's Code, would be found to stand before the sentence:

"WILL YOU SHOW THE NUMBER THAT REPRESENTS YOUR NAME?"

RED LIGHT.	GREEN LIGHT.
O.	
O, O, O, O, O.	
O, O, O, O, O, O, O.	
	O, O.

Here the number expressed is 1572, and per the same Code, stands for

"WHERE ARE YOU BOUND?"

RED LIGHT.	GREEN LIGHT.
O.	
O, O, O, O, O, O, O, O, O.	
	O, O.
	O, O, O, O, O, O, O, O.

The number thus expressed is 1928, and per said Code is

"WHAT IS YOUR CARGO?"

RED LIGHT.	GREEN LIGHT.
O, O, O, O, O.	
	O, O, O, O, O, O.
	O.
O, O, O.	

Here the number expressed is 5603, and stands for

"HAVE YOU ANY NEWS?"

(RED LIGHT.) (GREEN LIGHT)

Fig. 2

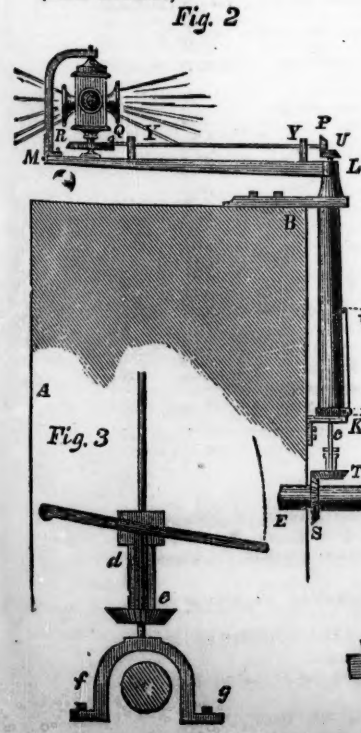

Fig. 1

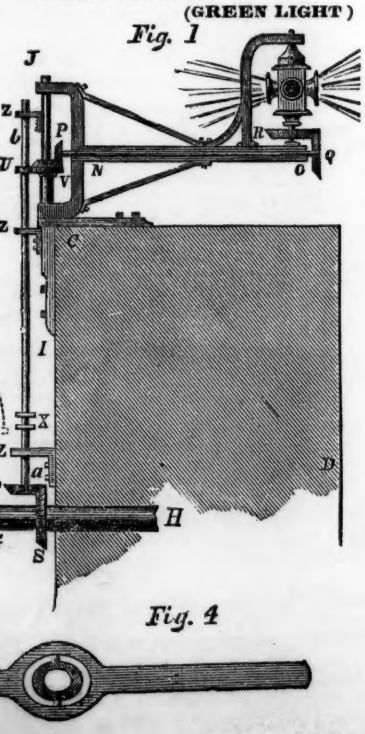

Fig. 3

Fig. 4

MECHANICAL CONSTRUCTION.

In our engravings, Figs. 1 and 2, represent Vertical Sections through the wheel-house. In them E F and G H represent portions of the main Shaft. In Fig. 1, I J is a stout Iron or Wooden post, fastened against the side of the wheel-house, directly over the main shaft On the upper part of this post, is fitted the moveable arm or crane N O, to the main shaft is fitted the bevel wheel S, and to the lower end of the rod a b, is fitted a corresponding wheel T. U is a small pinion on a b, which gears with the spur wheel, V, which in turns gives motion to the wheels, P and Q, and so revolves the lamp R. It will be seen that a Rotary motion is given to the lamp, when the main shaft is in motion and a b connected.

It can be disconnected by a lever, acting between the bosses X, which will elevate the rod in the guides Z Z Z.

Fig. 2 is another arrangement, for the same purpose. In this, K L, represent a hollow Shaft, on which is firmly fastened, the arm L M, on which is the lantern. The hollow post is secured to the wheel-house by the straps K and B, and it can turn freely in them, the other part being the same in them as in fig. 1

The lever K W, when drawn down, will turn the frame in any required position around the Shaft c U. In fig. 1, the arm or crane N O, may be operated by cords from the wheel-house, but in this device, the rod c U, does not lift up as in fig. 1, but in its place, the lower end is made square, and on it slides the short tube, d E, shown in fig. 3. The lower end of the rod turns on a bridge, f g, spanning the main shaft. On the upper end of the tube, d e, a lever is attached by means of boxes and collars as shown in fig. 4. This lever when raised carries with it the beveled wheel T, thus disconnecting the gearing apparatus.

ALBERT POTTS, Patentee,
PHILADELPHIA, Pa.

PATENT BITUMINIZED PIPES,

For the Conveyance of Water, Gas, and Drainage.

This important invention, patented by Mr. Charles Newbold, and now for the first time introduced to the public, may confidently be stated to be one of the greatest interest and commercial value, as the Patent Bituminized Pipes possess all the qualities necessary for the conveyance of Water, Gas, Sewage, Mine-Pumps, &c., viz.: great strength, great durability, and inoxidability, with the immense advantage of being about *one fifth* the weight of iron pipes, and about 35 per cent. cheaper; whilst, compared with lead pipes, the Bituminized Pipes are only about *one fourth* their price, without the possibility of the formation of the oxide and carbonate of lead, so dangerous for every purpose. They will stand 150 degrees of Heat, and after many trials it has been satisfactorily proved that rats or vermin will not touch them. They also withstand the action of all acids and salts.

Iron pipes are at present frequently covered with a coating of bitumen or coal tar before they are laid down; but the adherence of this coating to the metal being very imperfect, on account of vibration and the difference of expansion, this preservation is insufficient, besides being exposed to a number of influences which neutralize its efficacy—galvanic currents materially assist the formation of oxides and deposits, which cause the obstruction and eventually the destruction of metallic pipes.

The Patent Bituminized Pipes are neutral, non-conductors of electricity, and consequently are not exposed to any of the deteriorating influences mentioned above. The process of manufacture of these Pipes consist in causing a roll of paper to pass through a reservoir of melted bitumen, after which it is tightly coiled around a mandril to any required thickness; and thus, when hardened, a tube is formed of perfect texture, great hardness, and enormous strength. These Pipes are proved, by hydraulic pressure, to resist a pressure of 220 lbs. to the square inch, equal to 506 feet head of water, which is more than double the altitude of the highest reservoir. The bituminous composition which unites and covers these Pipes is so well known as an excellent preservative, that it will be unnecessary to demonstrate that, when laid underground, the durability of the Patent Bituminized Pipes may be considered as unlimited. The Pipes are made in lengths of seven feet, and are connected by socket joints of the same material as the Pipes; or they can be fitted with iron flanged sockets, screwed together in a most simple and inexpensive manner.

For Gas these Pipes are invaluable; the Gas-lining which we insert effectualy resists the action of Gas, and being non-conductors, there can be no condensation in them, and the joints made with the Patent Cement are so strong as to entirely prevent Leakage.

The cost of laying the Pipe is also small, compared with those of iron, and can be done by mere laborers. The Bituminized Pipes have been in use the last three years, for the conveyance of gas and have been ascertained to be as perfect now as when first laid down.

DIRECTIONS FOR JOINING THE PATENT BITUMINIZED PIPES.

Pack the pipes level in the ordinary way; slip the collar over one of the pipes; draw the ends close together and warm them by putting a hot iron between them; then press them together so as to make them adhere; take a piece of iron wire netting, about half an inch in the mesh, a little narrower than the length of the collar, and long enough to wrap once round the pipe, spread the collar over it and the joining; close the ends with clay; pour the melted cement into the manhole of the collar, and fill up the interior space; then remove the clay and the joint is finished.

It is necessary to leave a small vent hole in the clay at each end of the collar to allow the air to escape as the cement is poured in, that there may be no flaws or air bubles in it when cold. If in cooling the cement settles in the manhole, fill up again.

N. B.—The cement should be broken into small pieces and melted in a pot as you do lead, at a low temperature, until it is dissolved; it must be stirred while melting; then take it off and keep stiring it as it cools until it becomes nearly as liquid as water; then pour quickly.

All Orders should be addressed to

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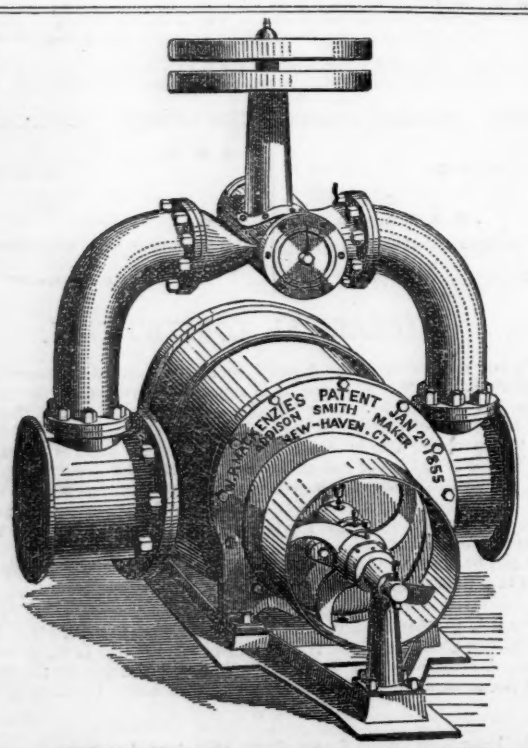
OFFICE 24 WATER STREET, BOSTON, MASS.,
J. McGEARY, AGENT;

or to FREDERICK W. BOND,
SOLE AGENT FOR NEW YORK,
58 LIBERTY STREET, (Between Broadway and Nassau Streets,) **NEW YORK.**

Cement for Joining, For Sale as above.



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AND

PATENT COMPENSATOR.

They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas, and add very much to the durability of the retorts, either clay or iron. The Compensator obviates entirely the necessity of water-joints, is compact, durable, cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.

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It is a perfect cover for all kinds of iron, tin, or wood-work, out-houses, and canvas coverings. It prevents and arrests the corrosion of metals, and is not affected by the action of salt, gases, acids, or ammonia.

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